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Herbin et al.

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(54) **LUMINOUS DEVICE**

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(52) **U.S. Cl.**
CPC ***F21S 43/27*** (2018.01); ***F21S 43/14*** (2018.01); ***F21S 43/19*** (2018.01); ***F21S 43/237*** (2018.01)

(58) **Field of Classification Search**
CPC F21S 43/27; F21S 43/237; F21S 43/14; F21S 43/19
See application file for complete search history.

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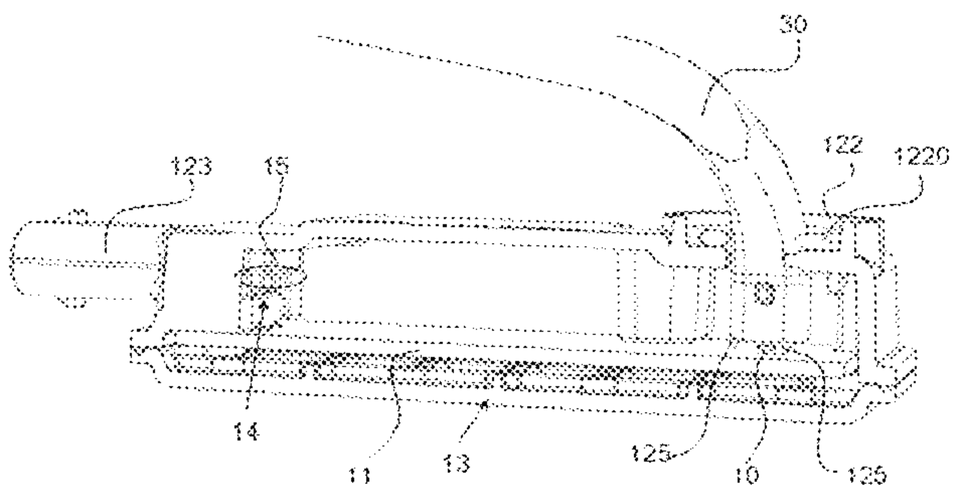
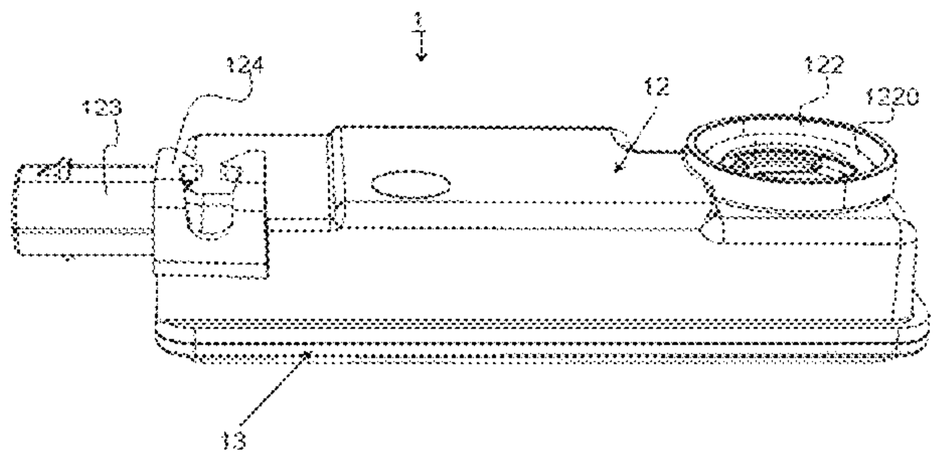
(57) **ABSTRACT**

The invention relates to a luminous motor-vehicle module including at least one light source, an open casing, and a closing element for closing said open casing. The open casing includes a housing for positioning on an optical element, the positioning housing includes a plurality of grooves, and a tab for hooking on a casing of said motor vehicle comprising the optical element and an outer lens for closing the casing, the luminous module being configured to make a rotation and hook, at the end of the rotation, onto the casing via said hooking tab of the open casing.

15 Claims, 15 Drawing Sheets





(51) **Int. Cl.**
F21S 43/14 (2018.01)
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Fig. 1a

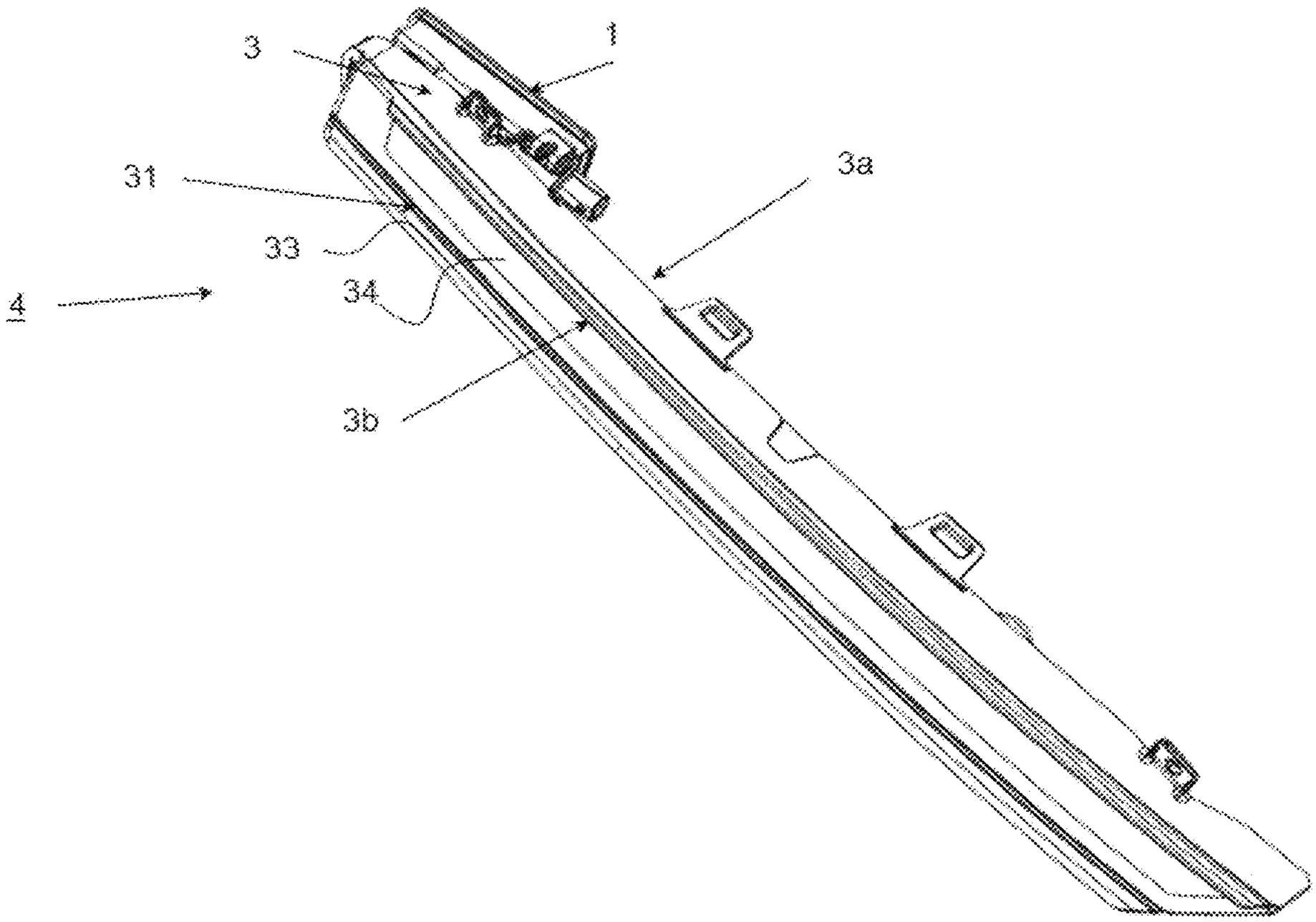


Fig. 1b

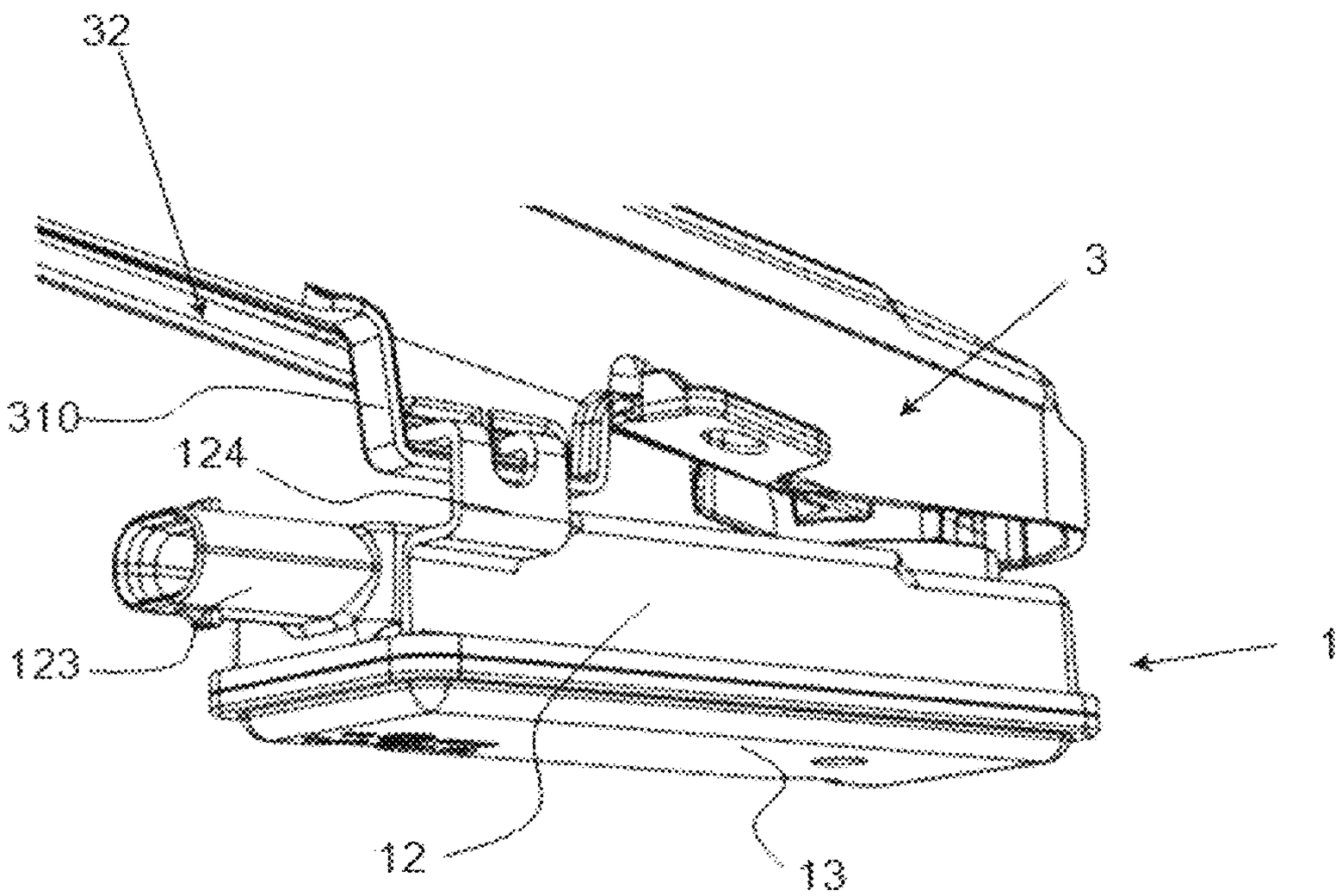


Fig. 2

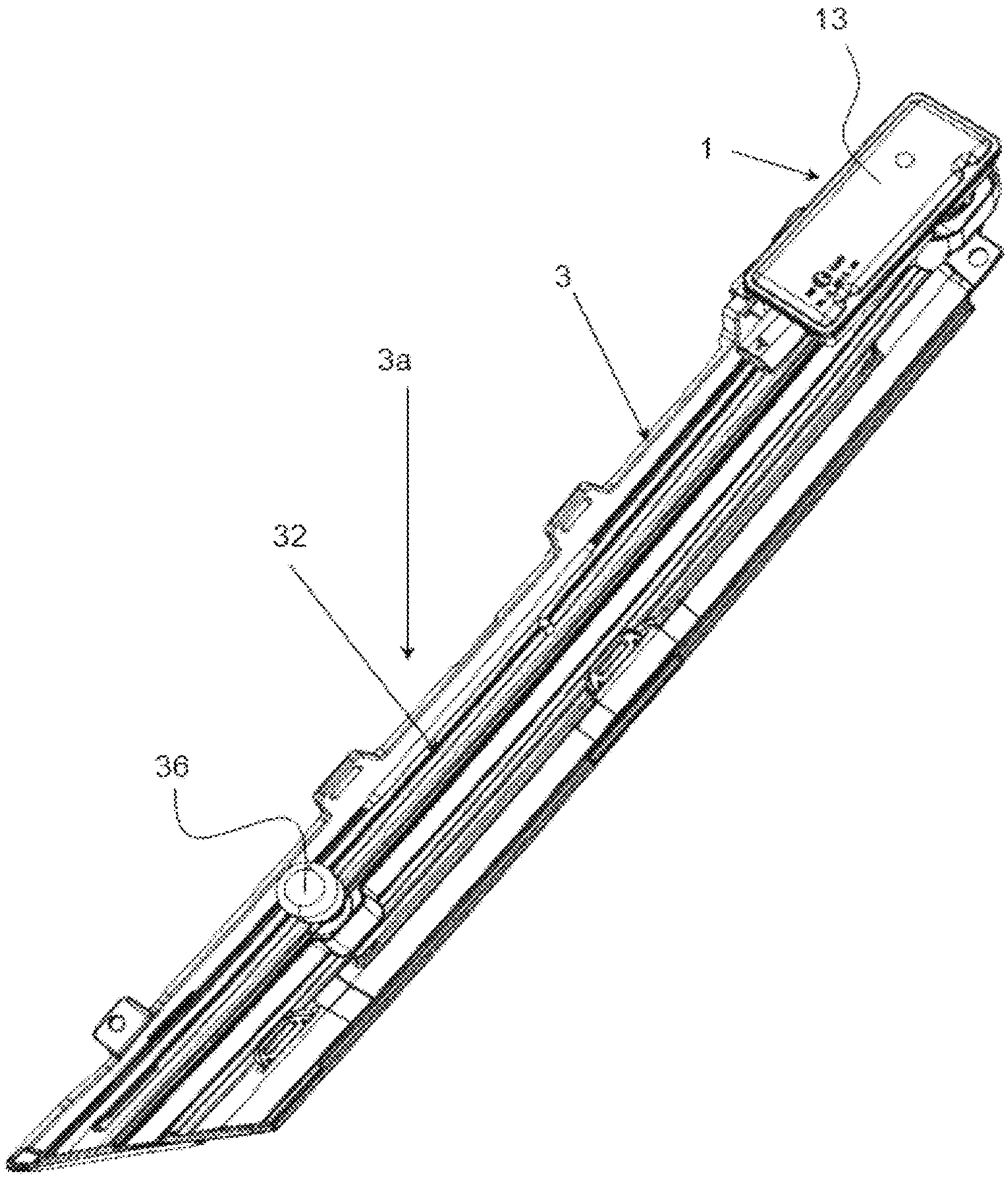


Fig. 3a

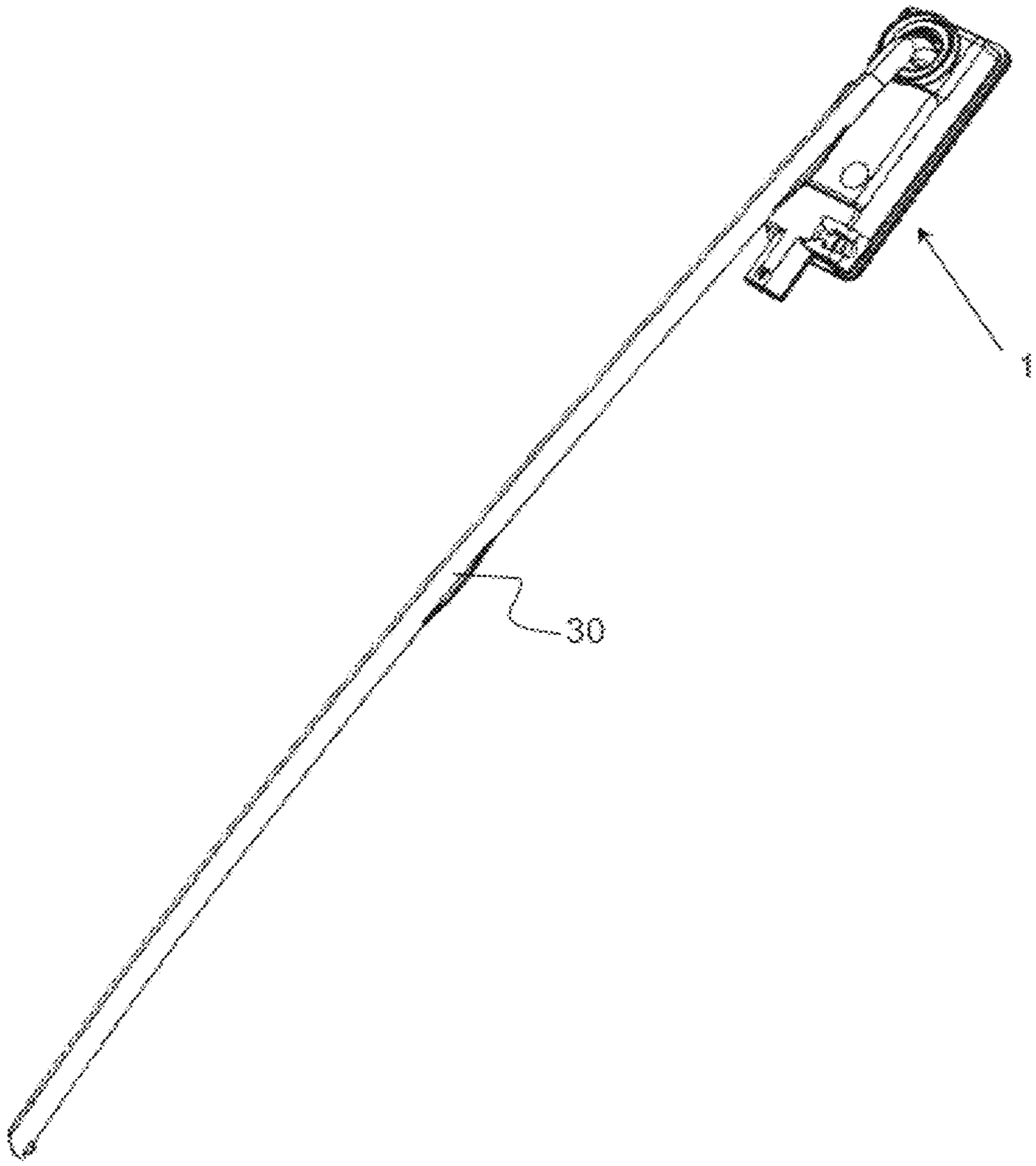


Fig. 3b

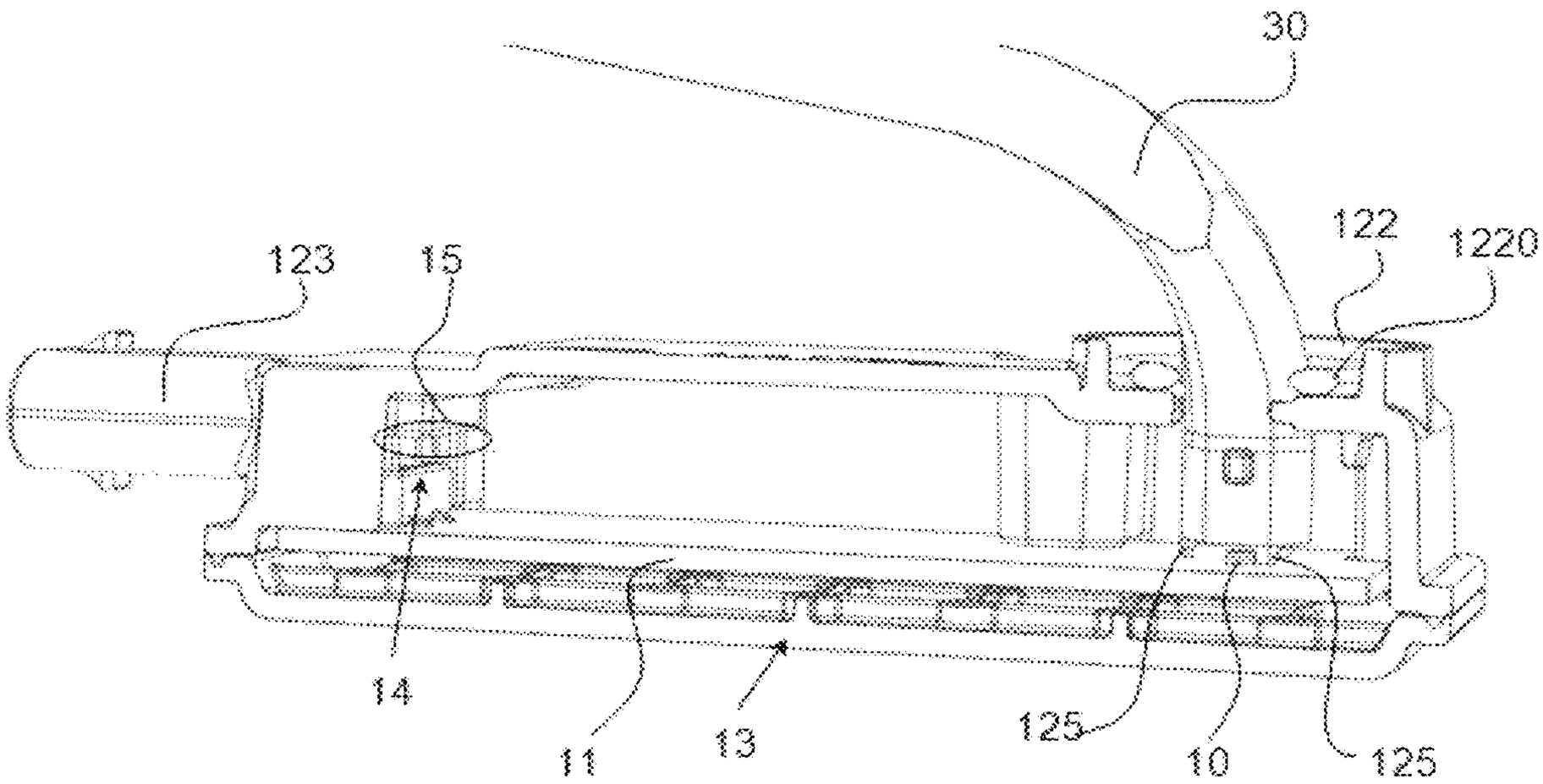


Fig. 4a

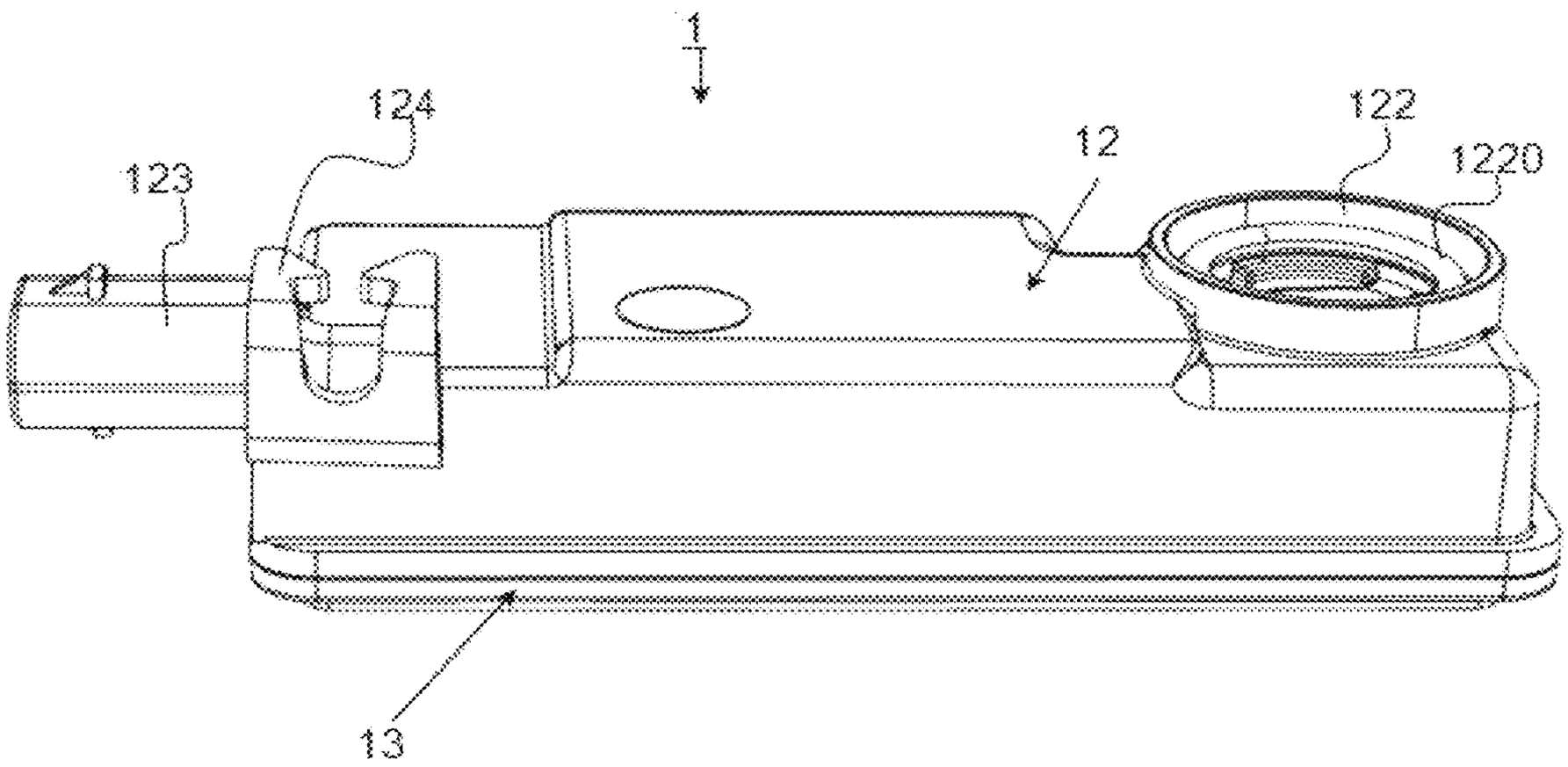


Fig. 4b

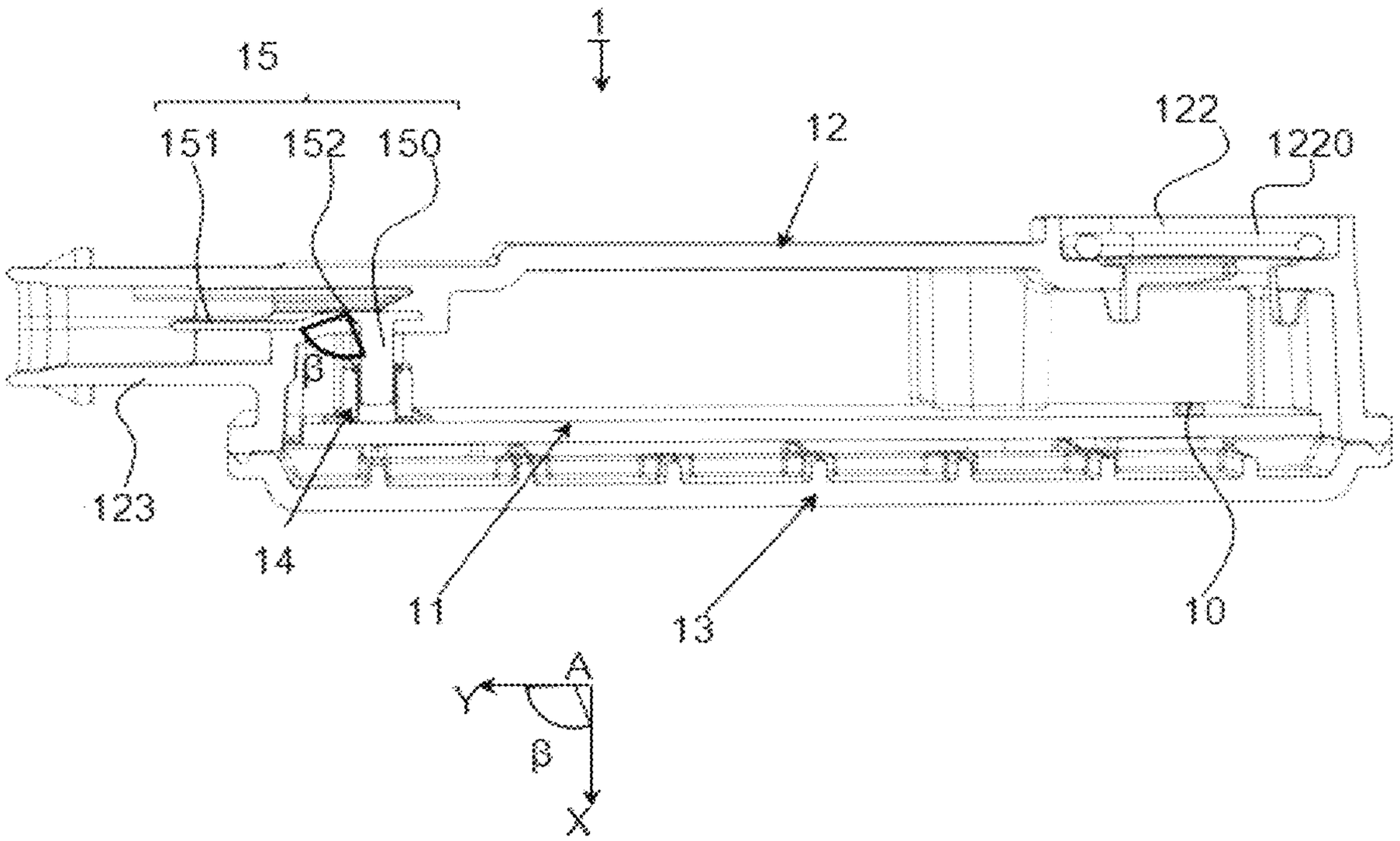
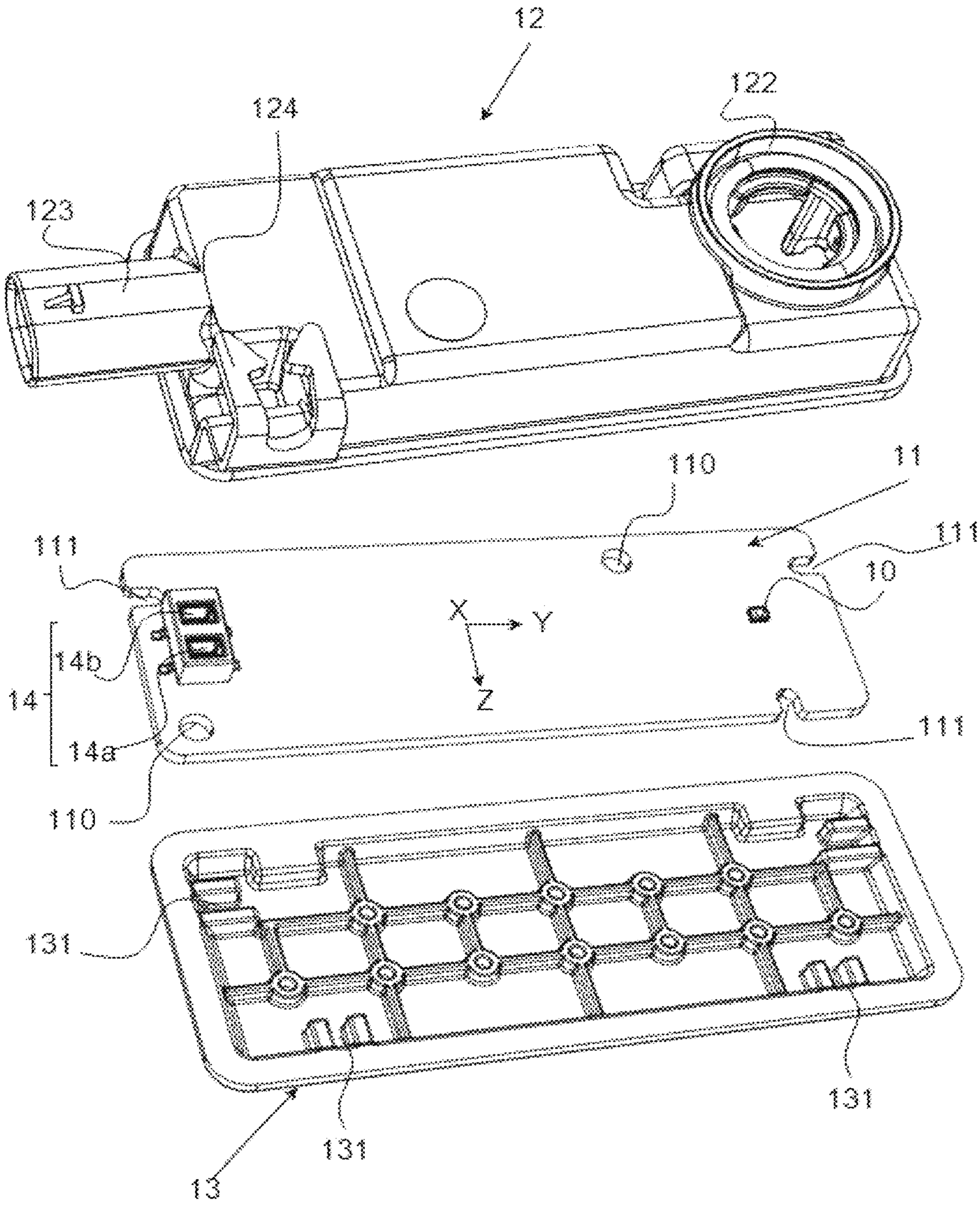


Fig. 5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10
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Fig. 6a

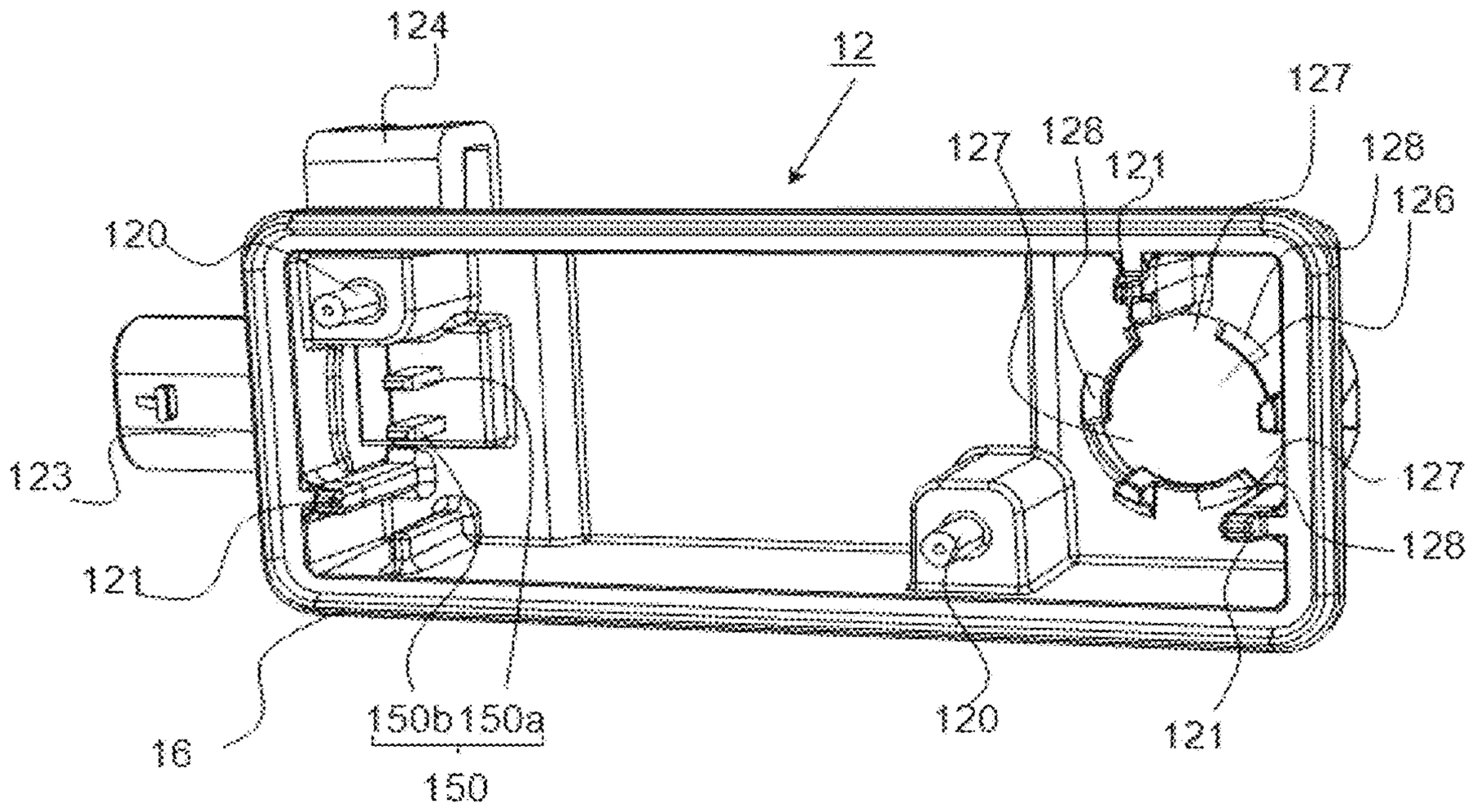
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Fig. 6b

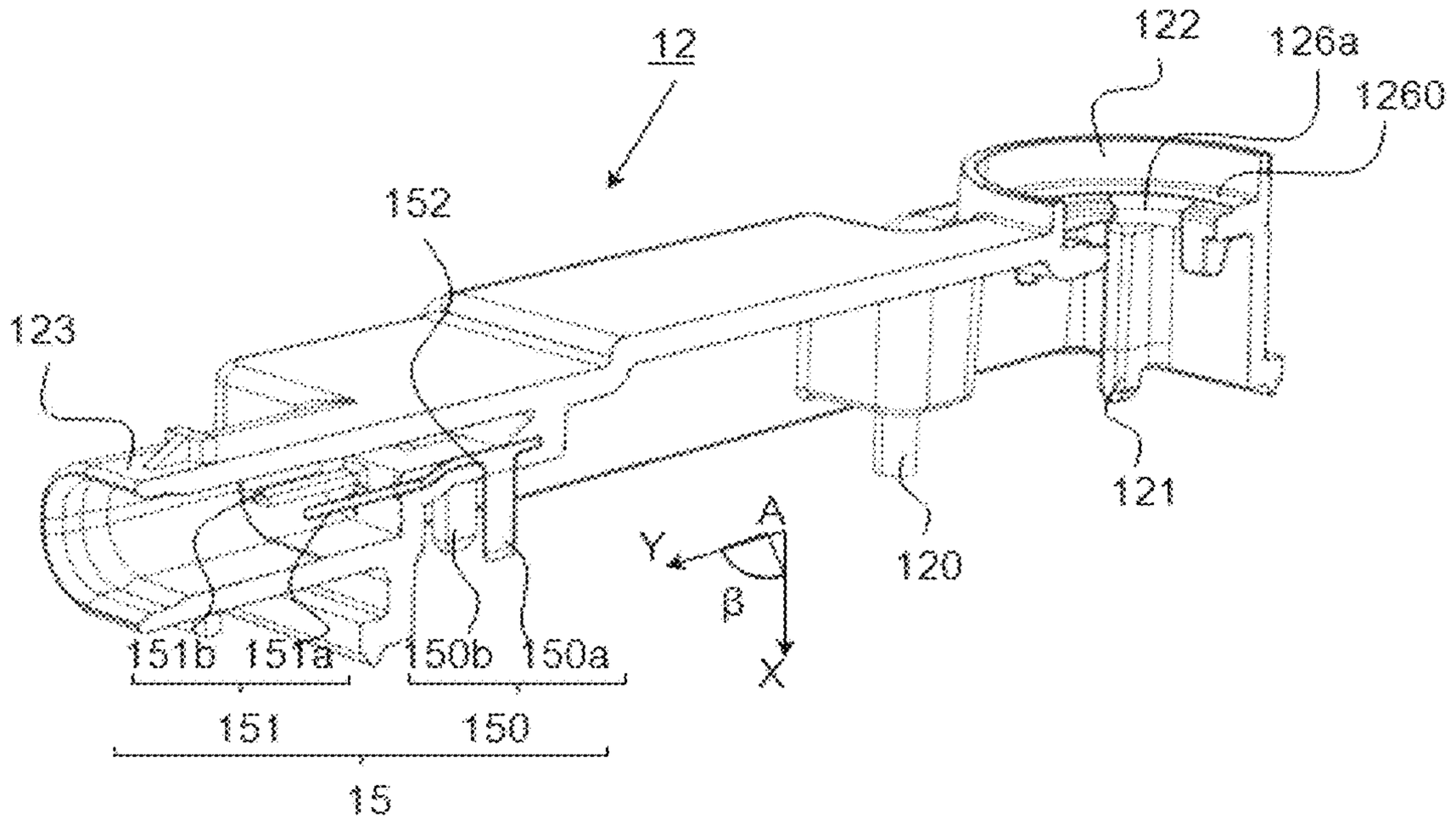
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Fig. 6c

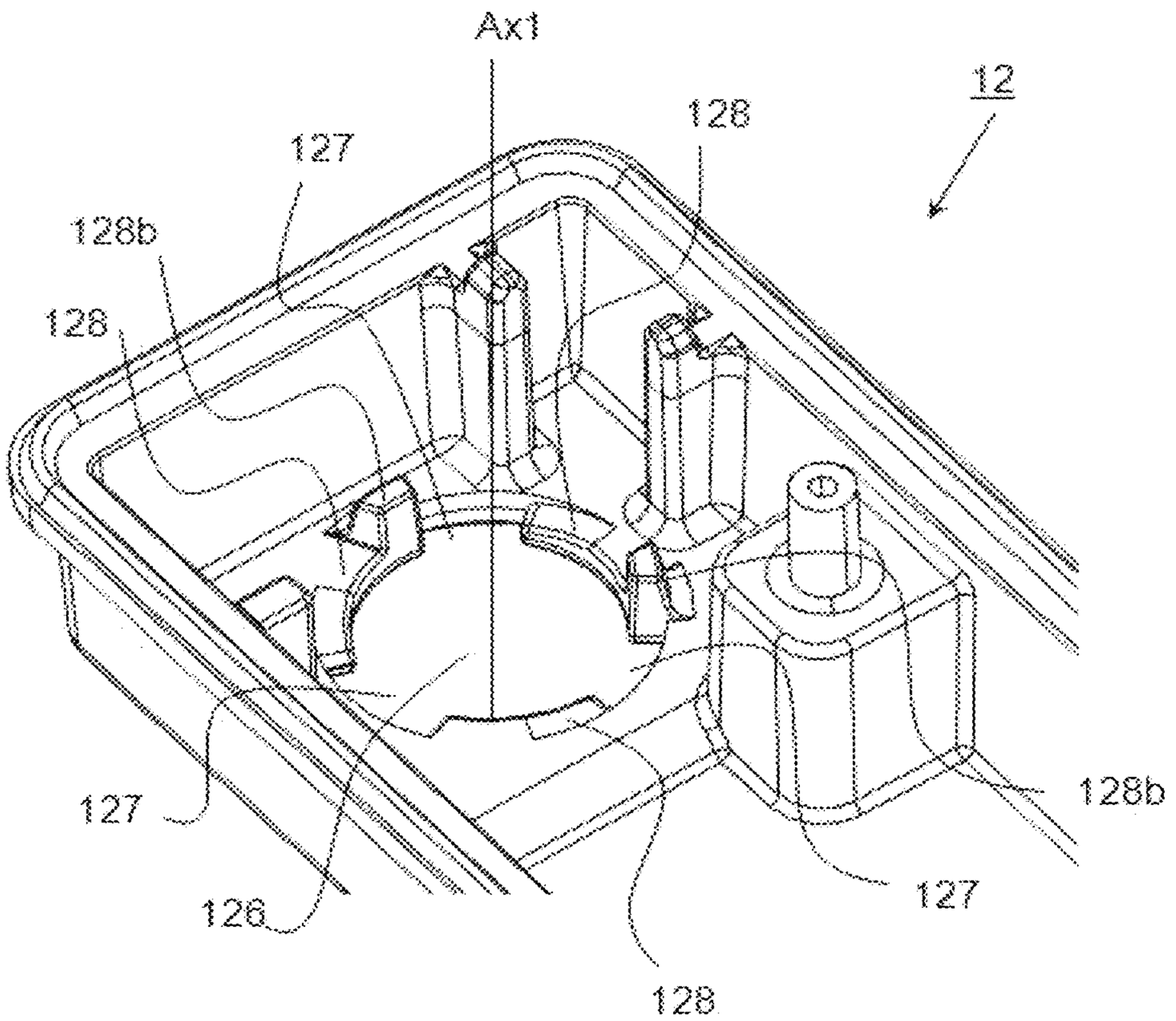


Fig. 7a

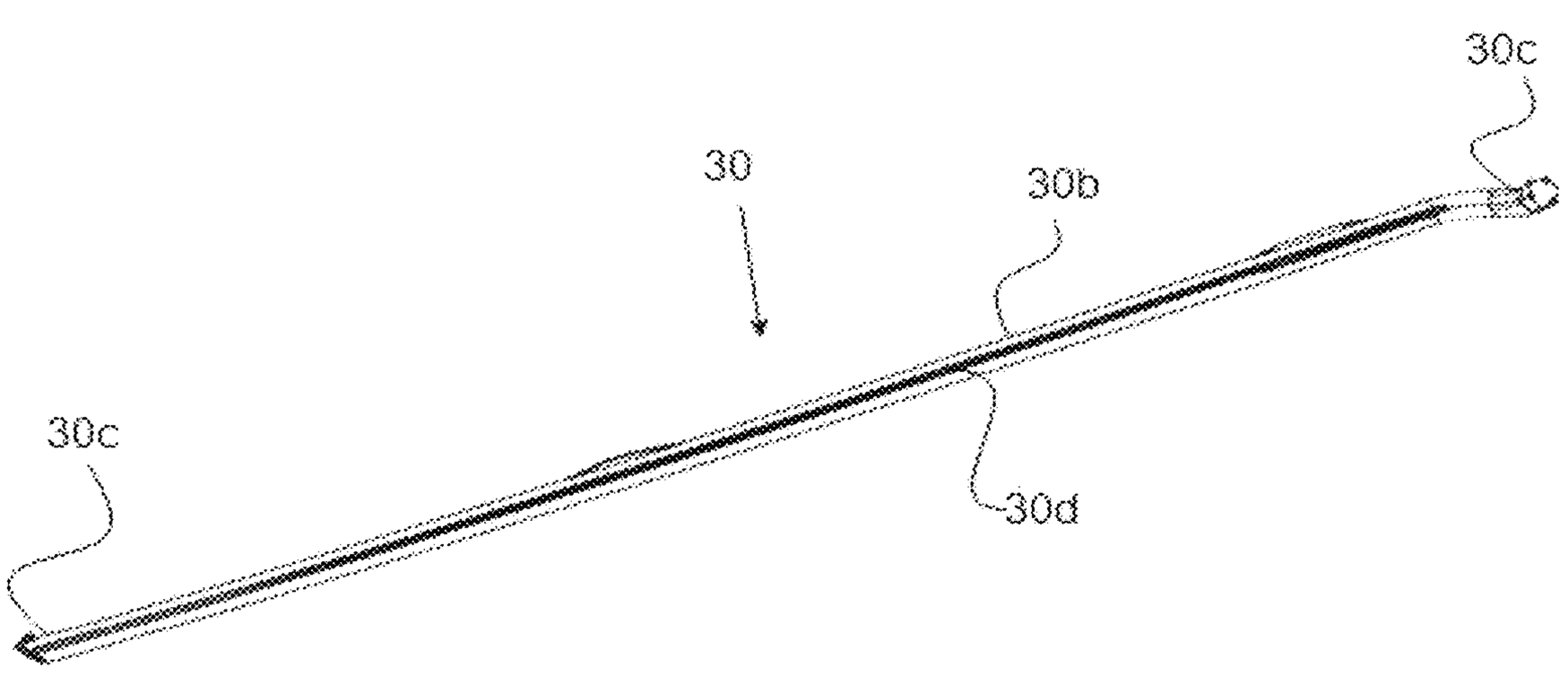


Fig. 7b

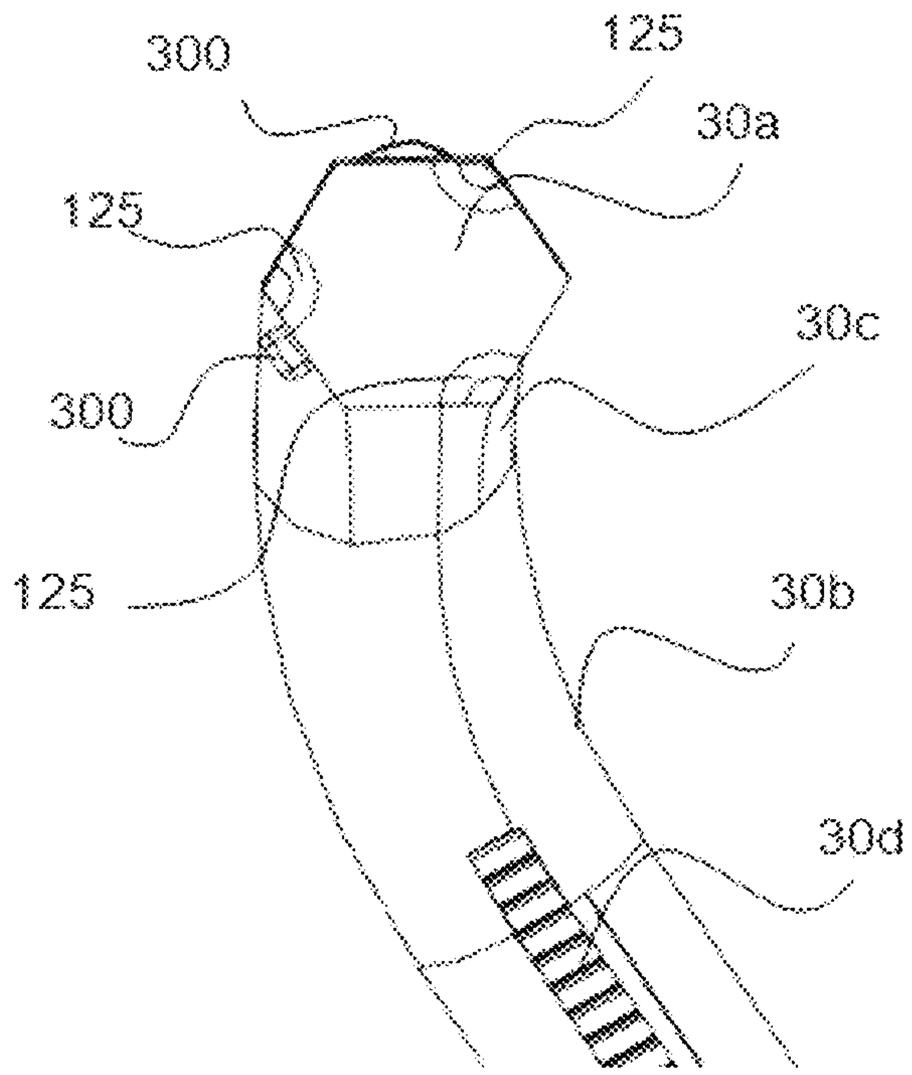


Fig. 8

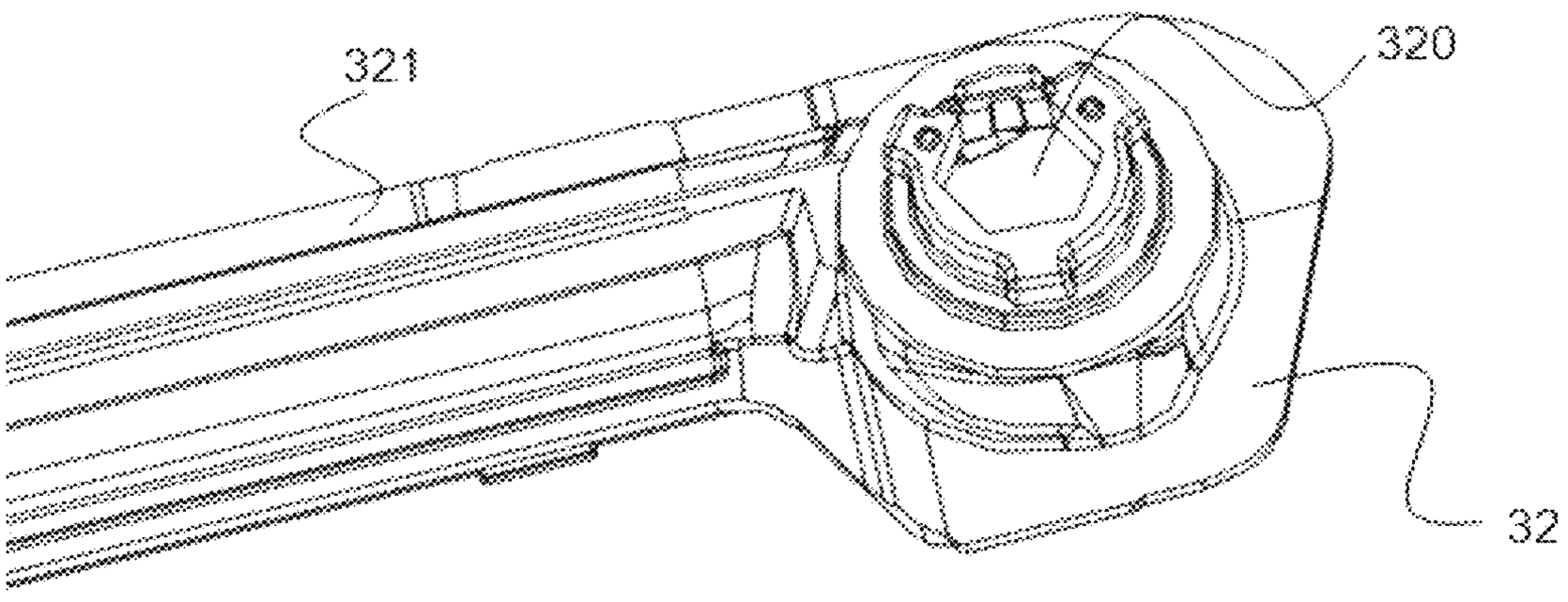


Fig. 9a

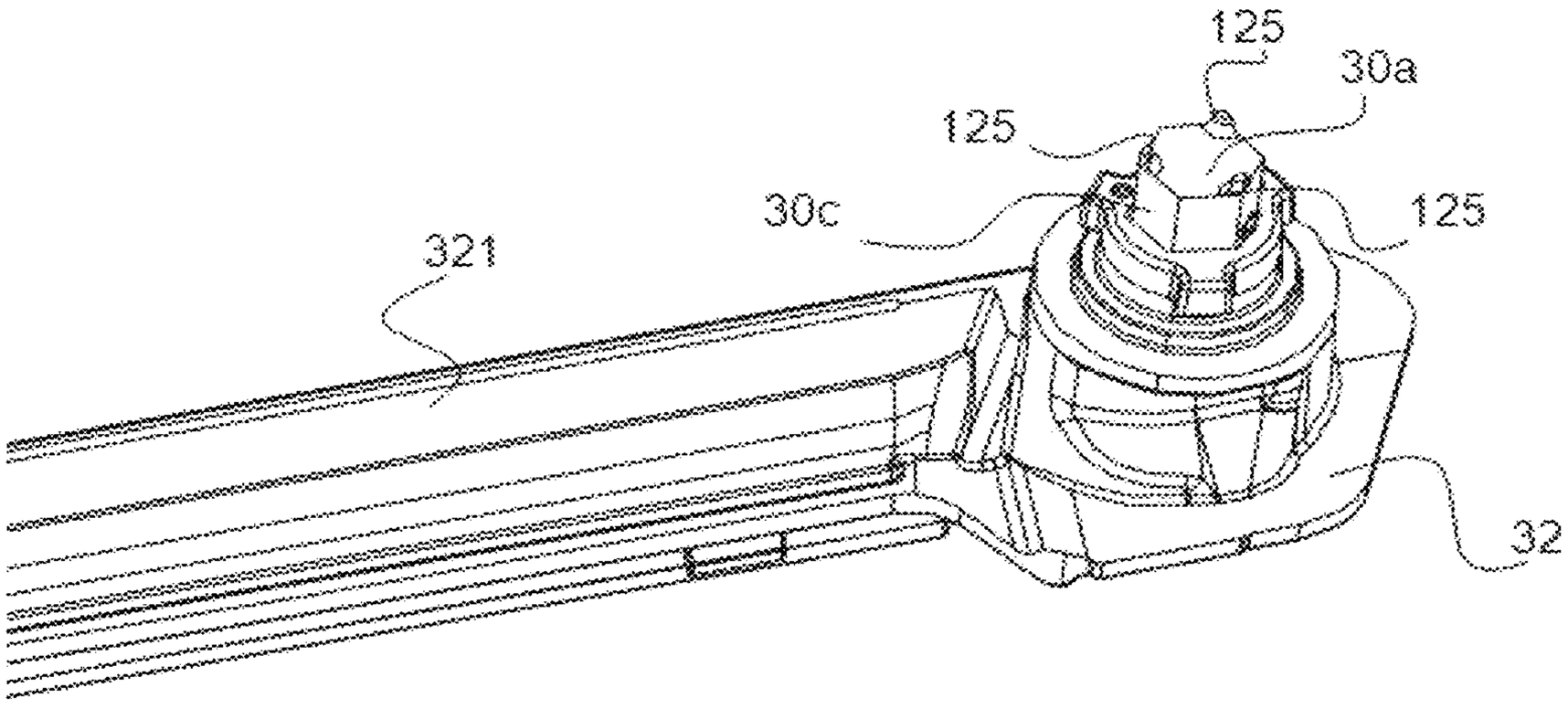


Fig. 9b

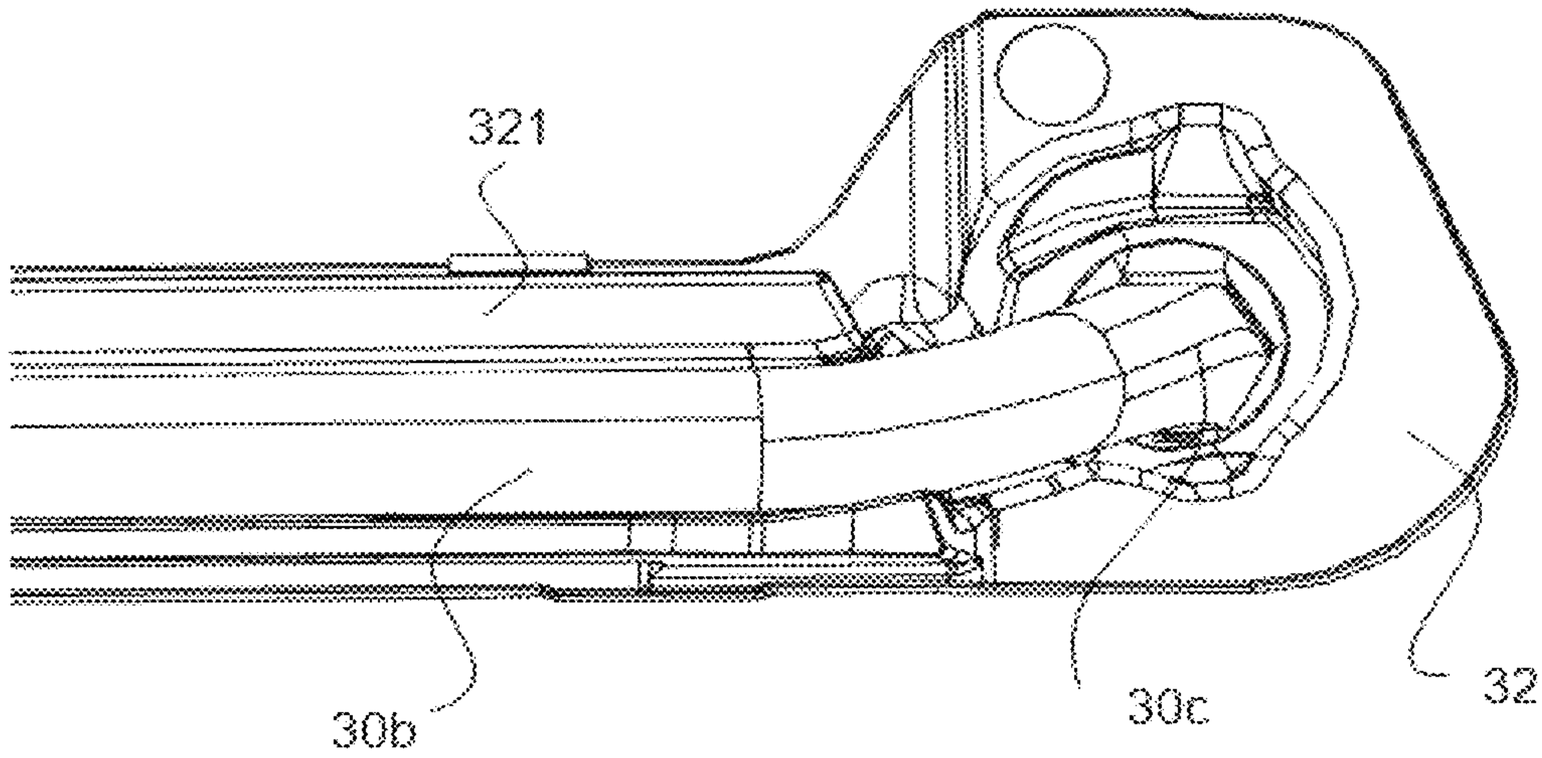


Fig. 10

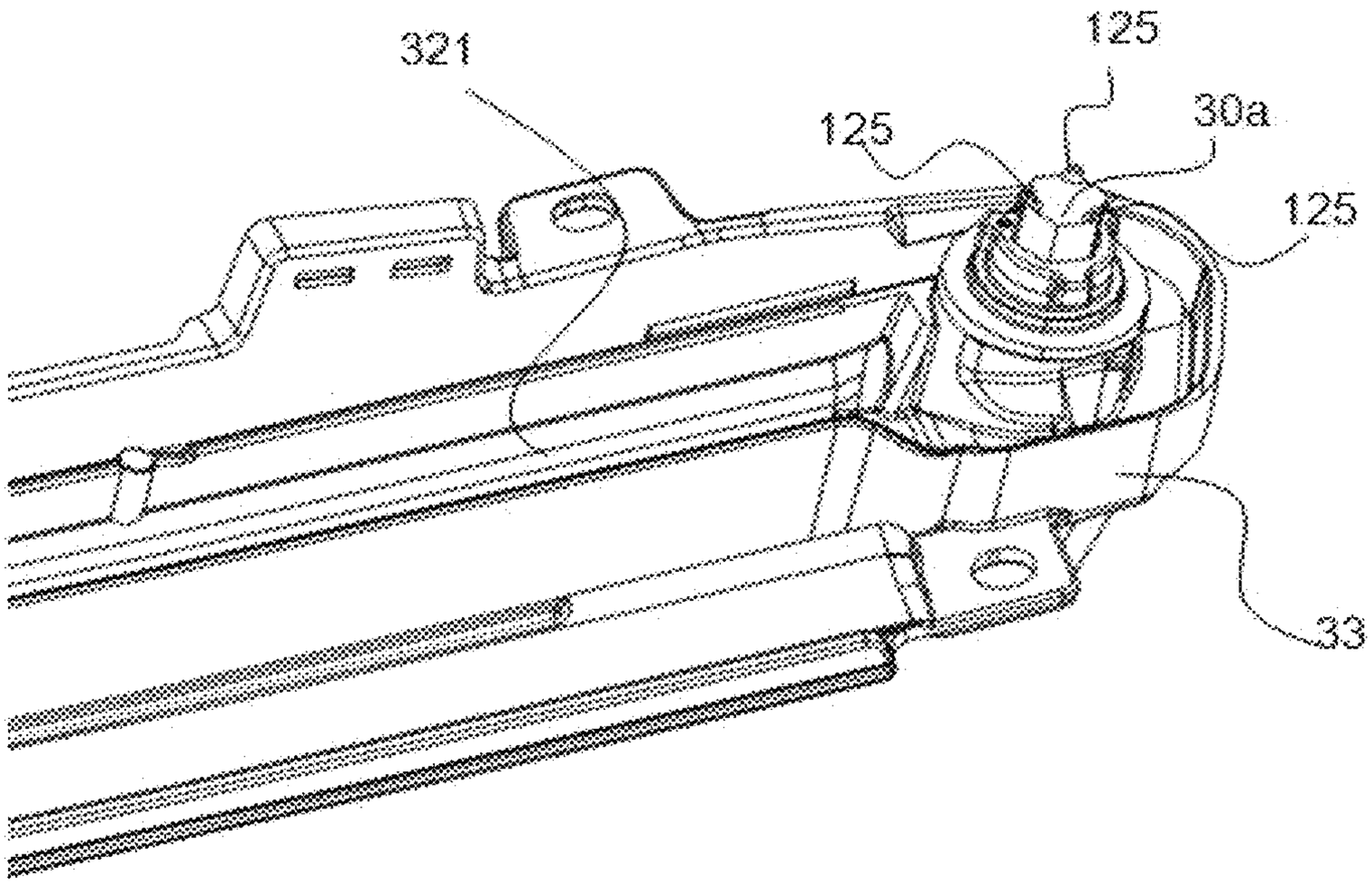


Fig. 11a

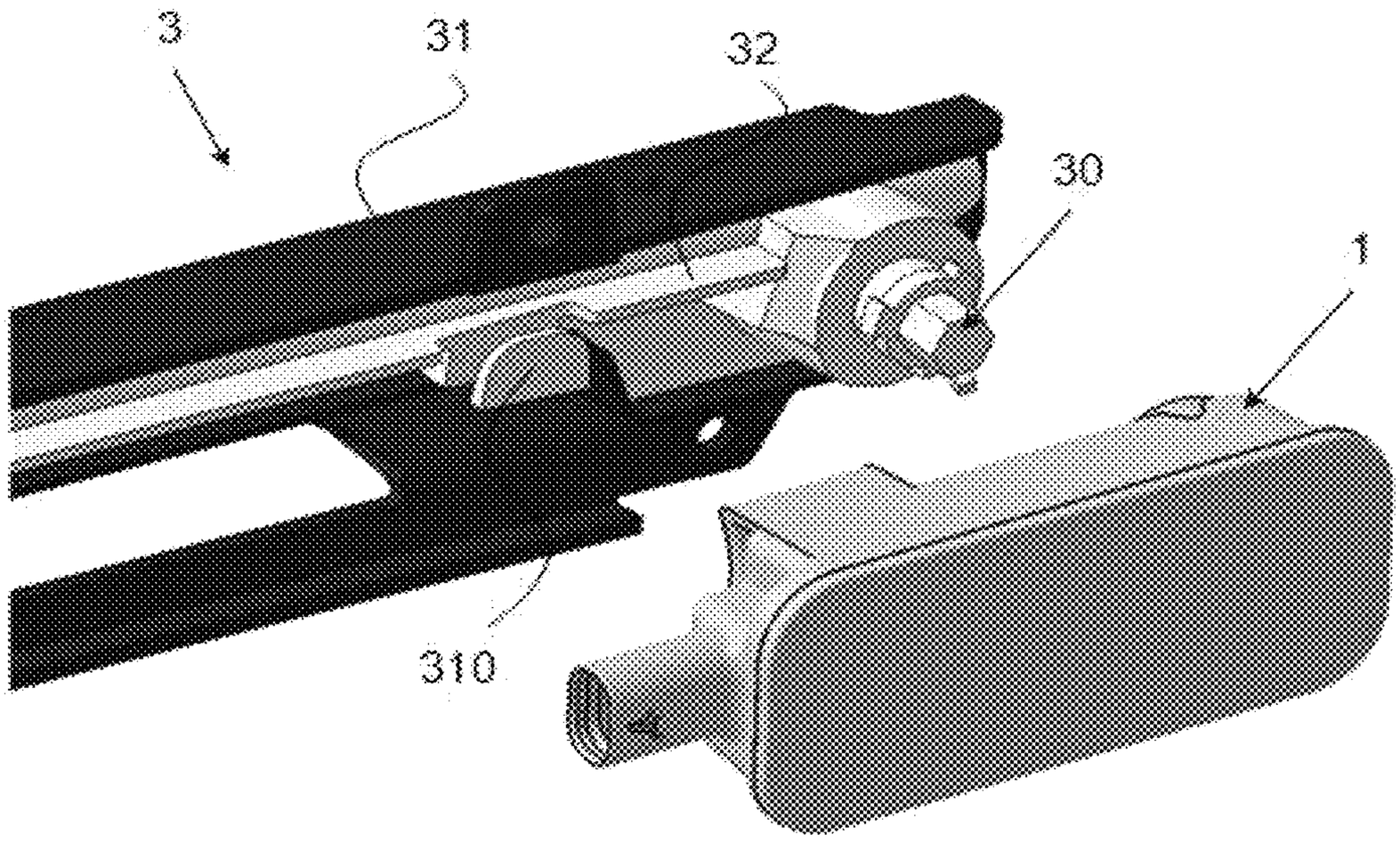


Fig. 11b

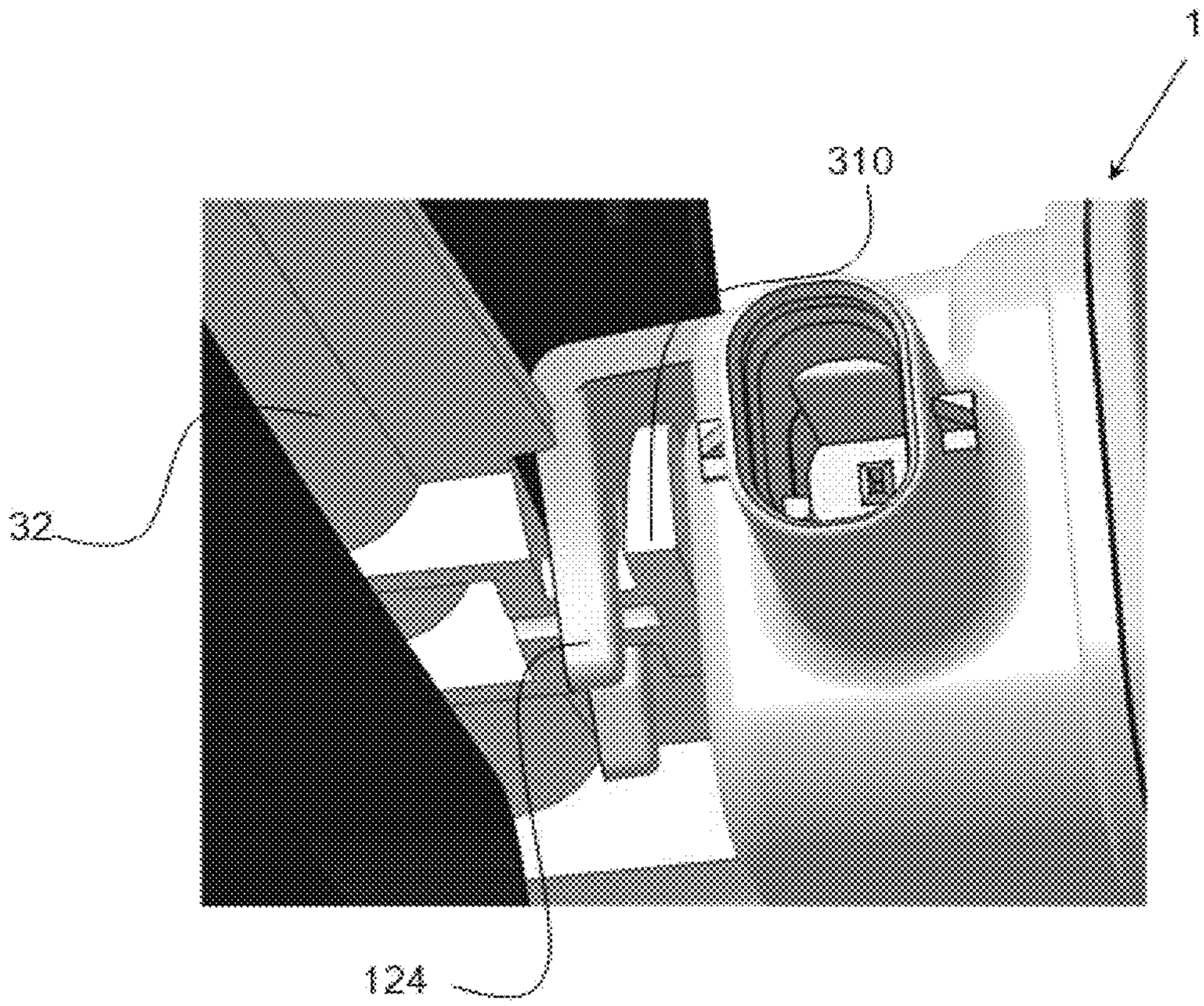


Fig. 12a

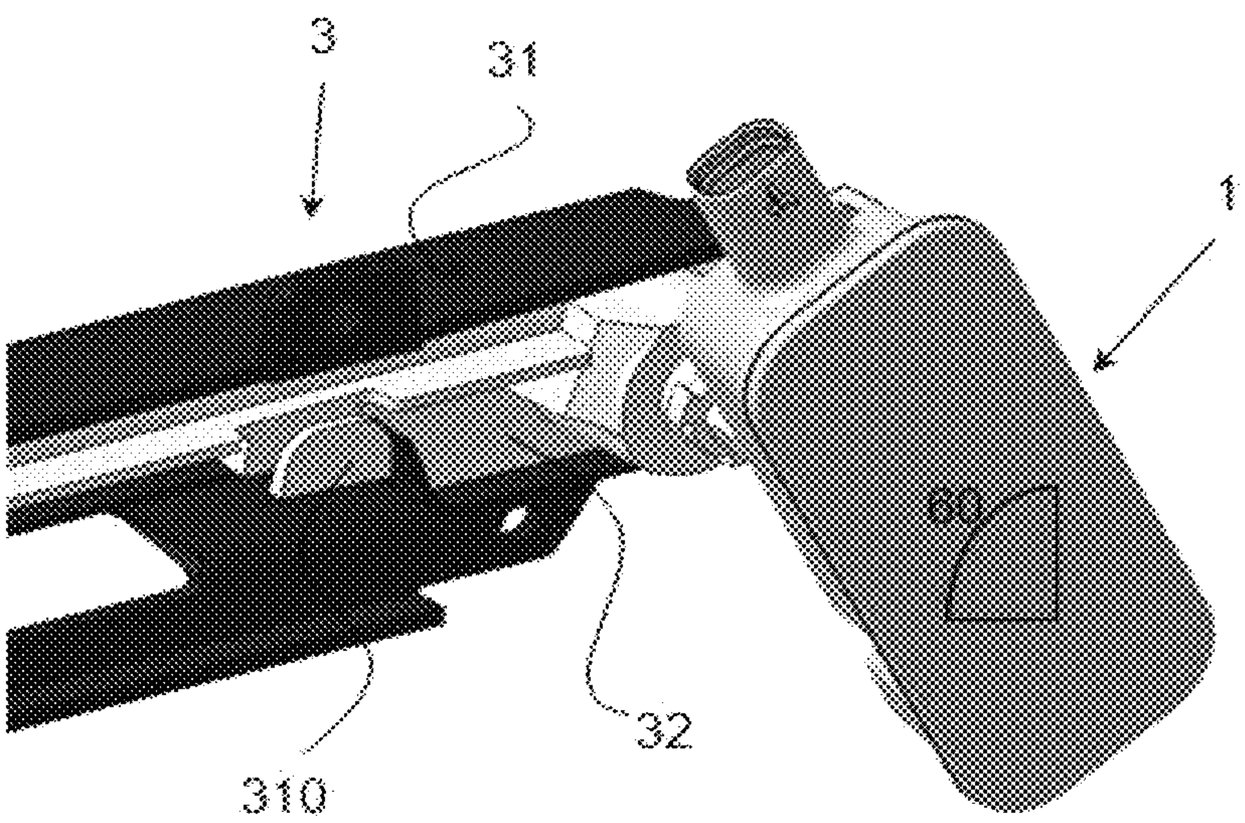


Fig. 12b

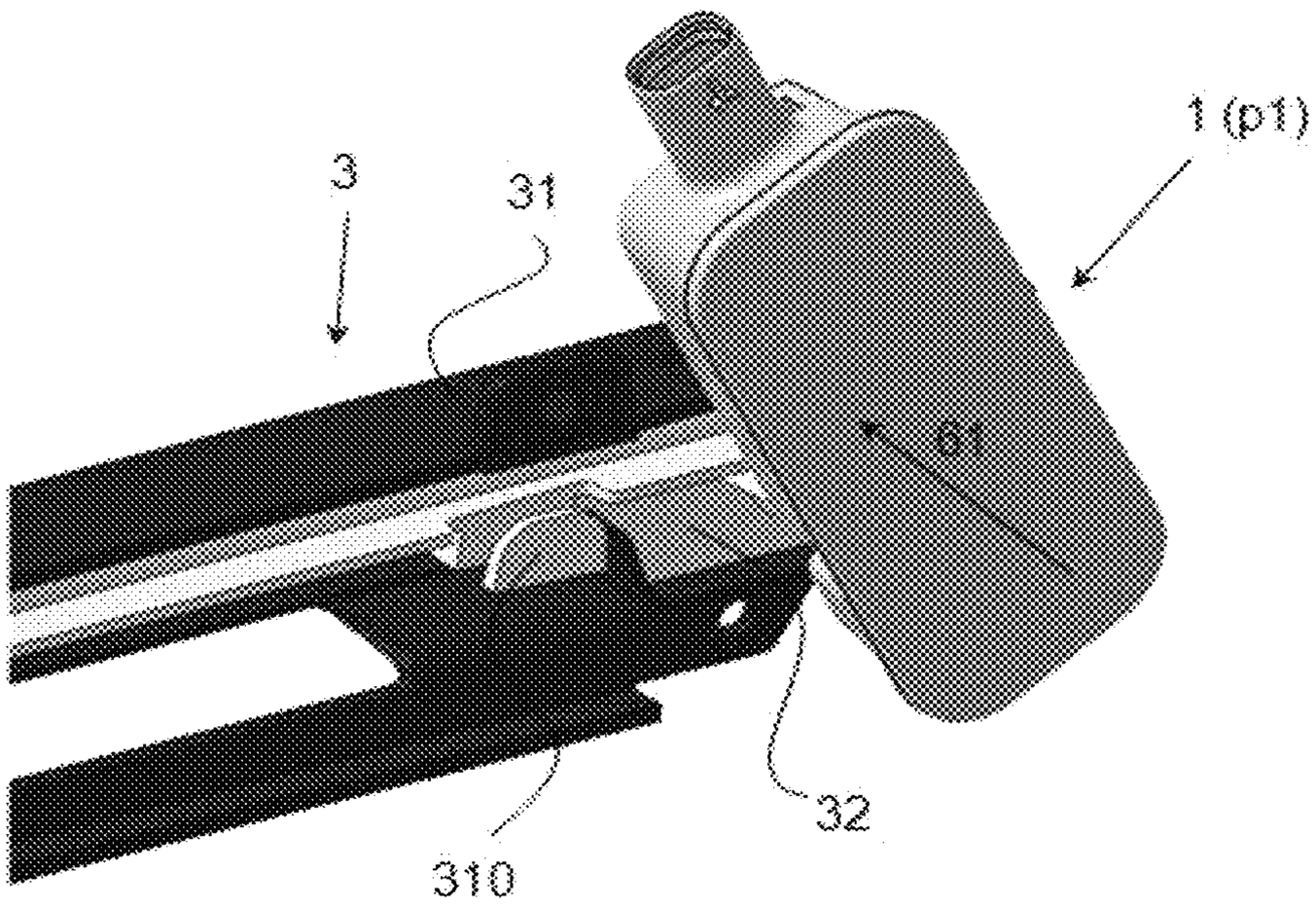


Fig. 12c

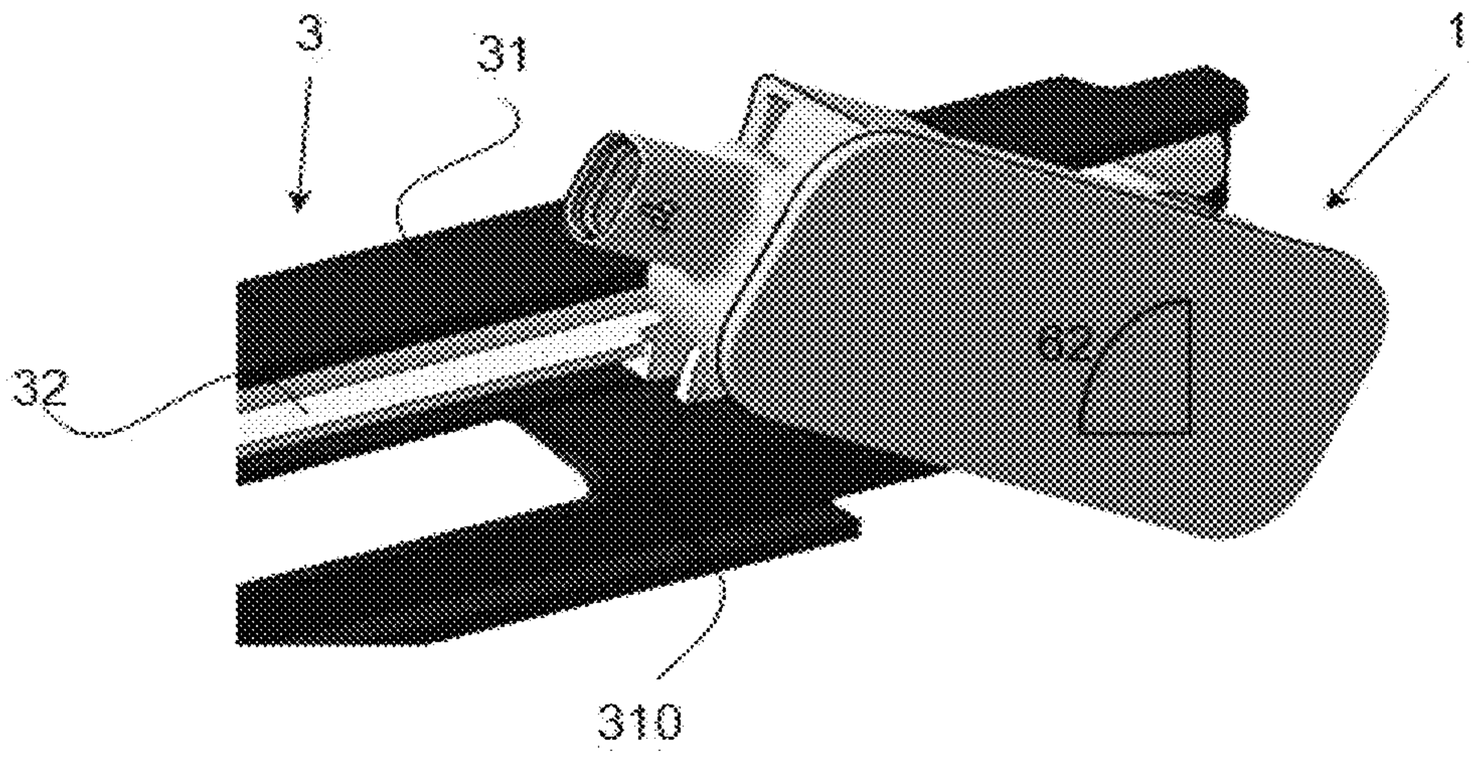


Fig. 12d

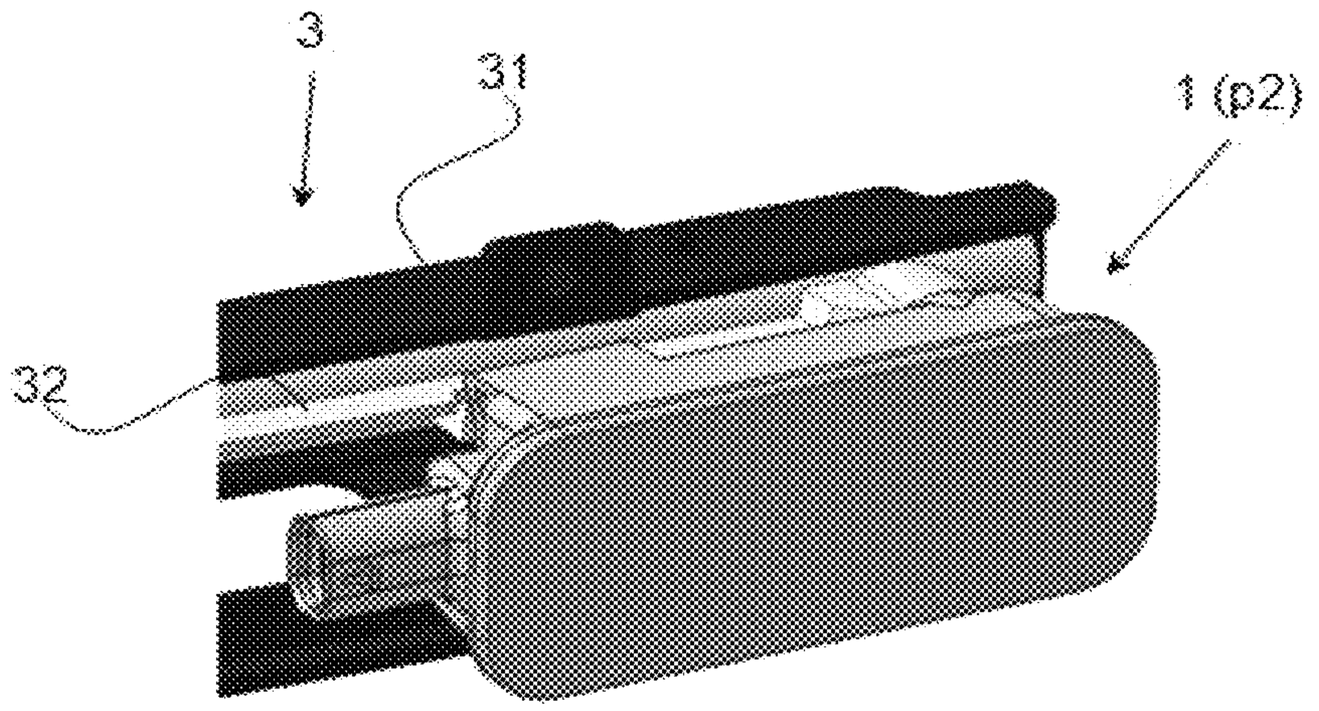
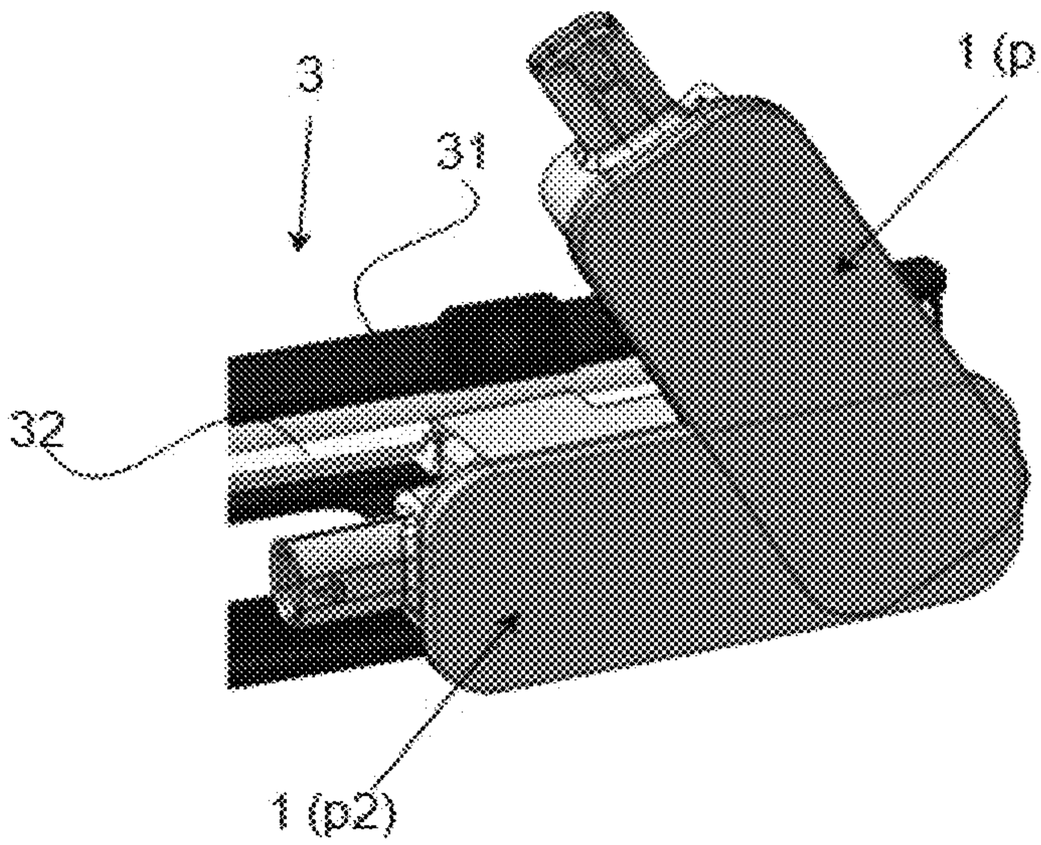


Fig. 12e



LUMINOUS DEVICE

The present invention relates to a luminous motor-vehicle module. Its particular but non-limiting application is to additional signaling lights.

A luminous module, such as an additional signaling light, known to those skilled in the art, comprises at least one light source, a light-source holder, an open casing, an element for closing the casing, and a cable harness for electrically connecting said at least one light source to an external connector of the motor vehicle. The luminous module is fastened, by means of a screw, to a motor-vehicle casing that is closed by an outer lens, and placed level with the grille of the front face of the motor vehicle. It is in particular fastened to an outer-lens holder level with said grille.

A drawback of this prior art is that, due to environmental constraints on the motor vehicle, there is little space in which to mount the luminous module on the motor vehicle. It is difficult to mount/demount the luminous module with a screwdriver due to the presence of other parts, such as the radiator, that are located behind the luminous module. Access with a view to mounting/demounting the module with a screwdriver is therefore difficult.

In this context, the present invention aims to provide a luminous module that allows the mentioned drawback to be resolved.

To this end, the invention provides a luminous motor-vehicle module comprising:

at least one light source,

an open casing,

a closing element for closing said open casing,

characterized in that said open casing comprises a housing for positioning on an optical element, said positioning housing comprising a plurality of grooves, and a tab for hooking on a casing of said motor vehicle comprising said optical element and an outer lens for closing said casing, said luminous module being configured to make a rotation and hook, at the end of the rotation, onto said casing via said hooking tab of said open casing.

Thus, as will be seen in detail below, by virtue of the positioning housing, the grooves, and the hooking tab, it is no longer necessary to use a screwdriver to fasten the luminous module in place. Moreover, the rotation allows the luminous module to be easily mounted on the casing of the motor vehicle and facilitates operator access to the luminous module. Moreover, no longer using a screwdriver avoids damaging the outer-lens holder, since a screwing/unscrewing action need no longer be applied to the outer-lens holder.

According to non-limiting embodiments, the luminous motor-vehicle module may further comprise one or more additional features, which may be implemented alone or in any technically possible combination, from among the following.

According to one non-limiting embodiment, said optical element is a light guide.

According to one non-limiting embodiment, said positioning housing comprises two or three grooves.

According to one non-limiting embodiment, said hooking tab is configured to hook onto a hooking bracket of an optical-element holder of said casing of the motor vehicle, or onto a hooking bracket of an outer-lens holder of said casing of the motor vehicle.

A motor-vehicle casing is also provided, said casing comprising an optical element, characterized in that said casing further comprises:

an optical-element holder,

an outer lens formed from an outer-lens holder and from a transparent optical part,

a hooking bracket for a hooking tab of a luminous module, said hooking bracket being secured to said optical-element holder or to said outer-lens holder.

According to one non-limiting embodiment, said optical element comprises lugs for positioning a luminous module.

According to one non-limiting embodiment, said optical element is positioned at the center of said positioning lugs.

According to one non-limiting embodiment, the positioning lugs are arranged around said optical element.

A luminous device comprising a luminous module according to any one of the preceding features and a casing according to any one of the preceding features is also provided.

The invention and its various applications will be better understood on reading the following description and examining the figures that accompany it:

FIG. **1***a* shows a three-quarter view from above of a luminous device comprising a luminous module, according to a first non-limiting embodiment of the invention,

FIG. **1***b* is a zoom in on the luminous module of FIG. **1***a*,

FIG. **2** is a three-quarter view from below of the luminous device of FIG. **1***a*, according to one non-limiting embodiment,

FIG. **3***a* shows the luminous module of FIG. **1***b* interacting with an optical element, according to one non-limiting embodiment,

FIG. **3***b* is a cross-sectional view of the luminous module of FIG. **3***a* interacting with said optical element, according to one non-limiting embodiment,

FIG. **4***a* is an assembled view of the luminous module of FIGS. **1***a* and **1***b*, according to one non-limiting embodiment,

FIG. **4***b* is a cross-sectional view of the luminous module of FIG. **4***a*,

FIG. **5** is an exploded view of the luminous module of FIG. **4***a*, the luminous module comprising at least one light source, a light-source holder, an open casing, and an element for closing the casing, according to one non-limiting embodiment,

FIG. **6***a* is a view of the open casing of FIG. **5**, according to one non-limiting embodiment,

FIG. **6***b* is a cross-sectional view of the open casing of FIG. **6***a*, according to one non-limiting embodiment,

FIG. **6***c* is a zoomed-in view of one portion of the open casing of FIG. **6***a*, according to one non-limiting embodiment,

FIG. **7***a* is a perspective view of the optical element of the luminous module of FIG. **3***a*, according to one non-limiting embodiment,

FIG. **7***b* is a zoomed-in view of one portion of the optical element of FIG. **7***b*, according to one non-limiting embodiment,

FIG. **8** is a zoomed-in view of one portion of an optical-element holder for the optical element of FIGS. **7***a* and **7***b*, according to one non-limiting embodiment,

FIG. **9***a* is a first zoomed-in view of the optical element of FIGS. **7***a* and **7***b* mounted on the optical-element holder of FIG. **8**, according to one non-limiting embodiment,

FIG. **9***b* is a second zoomed-in view of the optical element of FIGS. **7***a* and **7***b* mounted on the optical-element holder of FIG. **8**, according to one non-limiting embodiment,

FIG. **10** is a zoomed-in view of the assembly consisting of the optical element and the optical-element holder of FIGS. **9***a* and **9***b* assembled with an outer-lens holder of a

casing of the vehicle of the luminous device of FIG. **1**, according to one non-limiting embodiment,

FIG. **11***a* is a partial disassembled view of a luminous device comprising a luminous module and a motor-vehicle casing, according to a second non-limiting embodiment of the invention,

FIG. **11***b* is a zoom in on the luminous module assembled on the casing of the motor vehicle of the luminous device of FIG. **11***a*, according to one non-limiting embodiment,

FIG. **12***a* is a partial disassembled view of the luminous device of FIG. **11***a*, which illustrates a first step for mounting the luminous module on the casing of the motor vehicle, in which step the luminous module is in a first position, according to one non-limiting embodiment,

FIG. **12***b* is a partial view of the luminous device of FIG. **11***a*, which illustrates a second step for mounting the luminous module on the casing of the motor vehicle, according to one non-limiting embodiment,

FIG. **12***c* is a partial view of the luminous device of FIG. **11***a*, which illustrates a third step for mounting the luminous module on the casing of the motor vehicle, according to one non-limiting embodiment,

FIG. **12***d* is a partial assembled view of the luminous device of FIG. **11***a*, which illustrates a fourth step for mounting the luminous module on the casing of the motor vehicle, in which step the luminous module is in a second position, according to one non-limiting embodiment, and

FIG. **12***e* is a partial view of the luminous device of FIG. **11***a*, which illustrates the passage of the luminous module between the first position of FIG. **12***a* and the second position of FIG. **12***d*, according to one non-limiting embodiment.

Elements that are identical, in structure or in function, and that appear in a number of different figures have, unless otherwise specified, been designated with the same references.

The luminous motor-vehicle module **1** according to the invention is described with reference to FIGS. **1***a* to **12***d*. The term motor vehicle is understood to mean any type of motorized vehicle.

The luminous module **1** is juxtaposed with a casing **3** of the motor vehicle, the whole forming a luminous device **4**. The luminous module **1** thus forms part of a luminous device **4** (illustrated in FIG. **1***a*). In non-limiting embodiments, the luminous device **4** is a signaling light and/or a headlamp, or an interior lighting device.

In one non-limiting embodiment (illustrated in FIG. **1***a*), the casing **3** comprises an aperture closed by an outer lens **31**. In non-limiting embodiments, the casing **3** comprises:

a) at least one optical element **30**, such as illustrated in FIG. **3***a*, closed by an outer lens **31**, such as illustrated in FIG. **1***a*, or

b) an outer lens **31** alone.

It will be noted that the casing **3** may comprise other components configured to emit a light beam independently of the luminous module **1**. The casing **3** is also referred to as the second casing **3** in the rest of the description.

Non-limiting embodiment a) is taken by way of non-limiting example in the rest of the description. The outer lens **31** is formed from an outer-lens holder **33** and from a transparent optical part **34**. It closes the casing **3**. The casing **3** further comprises an optical-element holder **32**. Such as shown in FIG. **8**, the optical-element holder **32** comprises an orifice **320** through which a tip **30***c* of the optical element **30** may pass. In one non-limiting embodiment, the orifice **320** has a hexagonal shape that interacts with a hexagonal shape of the tip **30***c* of the optical element **30**. The optical element **30** is thus held in position, such as illustrated in FIG. **9***a*. Moreover, the optical-element holder **32** comprises a longitudinal body **321** in which the body **30***b* of the optical element **30** may be accommodated, such as illustrated in FIG. **9***b*. The optical-element holder **32** is configured to interact with the outer-lens holder **33**, such as shown in FIG. **10**. As may be seen, the outer-lens holder **33** covers the optical-element holder **32**.

The casing **3** further comprises a hooking bracket **310** for fastening the luminous module **1** to said casing **3** and blocking it in position. In a first non-limiting embodiment illustrated in FIG. **1***b*, the hooking bracket **310** is secured to said outer-lens holder **33**. As may be seen in FIG. **1***b*, the hooking tab **124** of the luminous module **1** interacts with the hooking bracket **310** of the outer-lens holder **33**.

In a second embodiment illustrated in FIG. **11***a*, the hooking bracket **310** is secured to said optical-element holder **32**. As may be seen in FIG. **11***b*, the hooking tab **124** of the luminous module **1** interacts with the hooking bracket **310** of the optical-element holder **32**.

In one non-limiting embodiment, the luminous module **1** is an additional signaling light juxtaposed with the casing **3** comprising said at least one optical element **30** closed by an outer lens **31**. The signaling light allows a luminous signaling function to be performed. The signaling light is taken by way of non-limiting example in the rest of the description. Of course, the invention is not limited to a signaling light, and may be applied to other types of luminous modules. The optical element **30** is configured to interact with at least one light source **10** (described below) of said luminous module **1**. In one non-limiting embodiment, it forms a headlamp. The headlamp enables a luminous lighting function to be performed. Of course, the invention is not limited to a headlamp. Thus, in the non-limiting embodiment taken as example, the luminous device **4** is a headlamp and a signaling light.

In one non-limiting embodiment, the luminous signaling function is:

a turn indicator (TI), and/or
a daytime running light (DRL), and/or
a parking lamp (PL), and/or
a position or "tail" lamp (T), and/or
a stop lamp (STP), and/or
a reversing light (R), and/or
a fog light (FG), and/or
a side marker (SM), and/or
a center high-mount stop light (CHMSL).

Such as illustrated in FIGS. **1***a* to **2**, the luminous module **1** is mounted on the casing **3** of the motor vehicle. In particular, it is mounted on the rear **3***a* of said casing **3**. In one non-limiting embodiment, the luminous module **1** is mounted between the casing **3** and the body (not illustrated) of the motor vehicle. It is mounted in a space that is limited, especially depthwise. In one non-limiting example, this space is about 10 centimeters. In one non-limiting example, there is a clearance of about 10 mm between the luminous module **1** and the body. Such as illustrated in FIG. **1***a*, the luminous module **1** is juxtaposed with the casing **3**. The outer lens **31** of the casing **3** is on the side opposite to the luminous module **1**. It is located on the front side **3***b* of the casing **3**.

The optical element **30** of the casing **3** lies beside said outer lens **31**. In the non-limiting example illustrated in FIGS. **3***a* and **3***b*, the optical element **30** of the casing **3** is a light guide that extends along the casing **3**. [**46**] This non-limiting embodiment is taken by way of non-limiting example in the rest of the description. Such as illustrated in

FIGS. **7***a* and **7***b*, the light guide **30** comprises reflective elements **30***d* and a body **30***b* with two ends **30***c*, one of the ends **30***c* comprising a planar surface **30***a*. The planar surface **30***a* is configured to be placed facing the light source **10**. The body **30***b* is configured to be placed in the optical-element holder **32**, such as shown in FIG. **9***b*. One of the ends **30***c* of the body **30***b* is configured to be inserted into the interface **122** of the open casing **12**, which interface is described below. In one non-limiting embodiment, said end **30***c* has a hexagonal shape so as to ensure it is correctly fitted into the orifice **321** of the optical-element holder **32**. Moreover, in one non-limiting embodiment illustrated in FIG. **7***b*, the light guide **30** further comprises lugs **300** for positioning the luminous module **1**. In one illustrated non-limiting example, it comprises two positioning lugs **300**. In one non-limiting embodiment, the light guide **30** is positioned at the center of said positioning lugs **300**. The positioning lugs **300** are placed around the light guide **30**. This allows better positioning with respect to said light source **10** described below. The positioning lugs **300** are placed on the periphery of one of the ends **30***c* of the light guide **30**. The positioning lugs **300** are configured to interact with grooves **127** and guiding regions **128** of a positioning housing **126** of the open casing **12**, such as described below.

Such as illustrated in FIGS. **4***a* to **5**, the luminous module **1** comprises:

- at least one light source **10**,
- a light-source holder **11**,
- an open casing **12**,
- an element **13** for closing the open casing **12**,
- a primary electrical-connection element **14** connected to the light-source holder **11**,
- a secondary electrical-connection element **15** connected to the casing.

These various elements are described in detail below.

The light source **10** is illustrated in FIGS. **3***b*, **4***b* and **5**. In one illustrated non-limiting embodiment, the luminous module **1** comprises a single light source **10**. In another non-limiting embodiment (not illustrated), the luminous module **1** comprises a plurality of light sources **10**. In one non-limiting embodiment, said at least one light source **10** is a semiconductor light source. In one non-limiting embodiment, the semiconductor light source forms part of a light-emitting diode. By light-emitting diode, what is meant is any type of light-emitting diode, i.e. any of a conventional LED (light-emitting diode), an OLED (organic LED), an AMOLED (active-matrix-organic LED) or a FOLED (flexible OLED), to give non-limiting examples.

Said at least one light source **10** is configured to emit light rays which interact with the optical element **30** to generate a light beam. Said light beam allows the luminous signaling function to be performed. In the non-limiting example illustrated in FIG. **3***b*, said at least one light source **10** interacts with the light guide **30**. It is placed facing one end of the light guide **30**. In one non-limiting embodiment, said at least one light source **10** is placed on the light-source holder **11** described below.

The light-source holder **11** is illustrated in FIGS. **3***b*, **4***b* and **5**. It is sandwiched between the open casing **12** and the closing element **13**. It lies at 90° with respect to the axis of emission of the light rays from said at least one light source **10**. In one non-limiting embodiment illustrated in FIG. **5**, the light-source holder **11** is a printed circuit board assembly (PCBA). This PCBA comprises electronic components (not illustrated) such as, in one non-limiting example, a driver (not illustrated) for controlling said at least one light source **10**.

Such as illustrated in FIG. **5**, the primary electrical-connection element **14** is connected to the light-source holder **11**. Such as illustrated in FIG. **4***b*, it interacts with the secondary electrical-connection element **15** to make an electrical connection. In one non-limiting embodiment, said primary electrical-connection element **14** is soldered to the light-source holder **11**. In one illustrated non-limiting embodiment, said primary electrical-connection element **14** is a female connector. Having a female connector on the light-source holder **11** allows a more stable bearing surface to be achieved than would be the case if a male connector were used. Such as illustrated in FIG. **5**, the female connector **14** is composed of two terminals **14***a*, **14***b* (one positive, the other negative) joined to the light-source holder **11**. In one non-limiting example, the two terminals **14***a*, **14***b* are soldered to the light-source holder **11**.

In one non-limiting embodiment (not shown in FIG. **5**), the light-source holder **11** further comprises at least one reference orifice **110** configured to position it with respect to the open casing **12**. In one non-limiting variant embodiment, it comprises two reference orifices **110**. The latter interact with two reference pins **120** of the open casing **12**. They provide a reference with respect to Y- and Z-axes parallel to the light-source holder **11**.

In one non-limiting embodiment (not shown in FIG. **5**), the light-source holder **11** further comprises at least one positioning orifice **111** configured to guide the open casing **12** when it is assembled with the closing element **13**. In one non-limiting variant embodiment, it comprises three positioning orifices **111**. They interact with three positioning tabs **121** of the open casing **12**. They ensure correct positioning laterally (in both lateral directions).

The closing element **13** is illustrated in FIGS. **1***b* to **5**. In one non-limiting embodiment, the closing element **13** is a radiator or a closing cover. In the illustrated non-limiting example, it is a radiator. In one non-limiting embodiment, the closing element **13** is fastened to the open casing **12** by welding. The light-source holder **11** is fastened to the closing element **13**. When the closing element **13** is a radiator, in one non-limiting embodiment, the light-source holder **11** is fastened to the radiator **13** via an adhesive. When the closing element **13** is a closing cover, in one non-limiting embodiment (not illustrated), the light-source holder **11** is fastened to the closing cover **13** via fastening clips or rivets. In one non-limiting embodiment illustrated in FIG. **5**, the closing element **13** comprises at least one slide **131** for positioning the open casing **12**. In one non-limiting variant embodiment, it comprises three slides **131**. They interact with the positioning tabs **121** of the open casing **12**.

The open casing **12** is illustrated in FIGS. **1***b* to **6***b*. It is configured to cover the light-source holder **11**. In one non-limiting embodiment illustrated in FIG. **6***a*, the open casing **12** comprises at least one reference pin **120** for positioning the light-source holder **11**. In one non-limiting variant embodiment, it comprises two reference pins **120**. The two reference pins **120** are configured to ensure positioning of the light-source holder **11**. They interact with the reference orifices **110** of the light-source holder **11**. In one non-limiting embodiment illustrated in FIG. **6***a*, the open casing **12** comprises at least one positioning tab **121**. In one non-limiting variant embodiment, it comprises three positioning tabs **121**. The three positioning tabs **121** are configured to correctly position the open casing **12** with respect to the closing element of the casing **13**. These positioning tabs **121** are configured to pass through the positioning orifices **111** of the light-source holder and to engage in the slides **131** of the closing element **13**.

In one non-limiting embodiment illustrated in FIGS. **3***b* to **6***b*, the open casing **12** further comprises an interface **122** with the optical element **30**. In one non-limiting variant embodiment, this interface **122** is circular. In the non-limiting example of the light guide **30**, such as illustrated in FIG. **3***b*, one end **30***c* of the light guide **30** may be inserted into this interface **122**. The interface **122** is located facing the light source **10** so that the end **30***c*, and in particular its planar surface **30***a*, of the light guide **30** is located facing the light source **10**. Thus, the light rays of the light source **10** are directed into the light guide **30**. The interface **122** comprises an O-ring **1220** which ensures seal-tightness.

In one non-limiting embodiment illustrated in the figures, the open casing **12** further comprises a connector portion **123**. Such as illustrated in FIG. **6***b*, a secondary connection portion **151** of the secondary electrical-connection element **15** is inserted into the connector portion **123**, and configured to interact with an external connector (not illustrated) of the motor vehicle that allows the PCBA to be powered.

In one non-limiting embodiment illustrated in FIG. **6***a*, the open casing **12** further comprises a positioning housing **126** with a plurality of grooves **127**. Such as illustrated in FIG. **6***c*, the positioning housing **126** comprises a central axis Ax**1** perpendicular to the longitudinal direction of the open casing **12**. The positioning housing **126** has a substantially circular cross section and opens onto the interface **122** and the interior of the open casing **12**. The grooves **127** are produced in the housing **126**. Such as illustrated in FIG. **6***b*, the positioning housing **126** comprises a collar **1260** in which said grooves **127** are produced. Said grooves **127** start from said collar **1260** to open into said housing **126**, interior side of the open casing **12**. The positioning housing **126** allows the light guide **30**, and in particular one of its ends **30***c* which may be inserted into said positioning housing **126**, to be accommodated. The grooves **127** allow the positioning lugs **300** of the light guide **30** to be blocked.

In one non-limiting example (not illustrated), the positioning housing **126** comprises three grooves **127**. In one non-limiting embodiment, the three grooves **127** are angularly offset by 120°. In another non-limiting example (not illustrated), it comprises two grooves **127**. In one non-limiting embodiment, the two grooves **127** are angularly offset by 180°, i.e. they are placed facing each other. Angularly offsetting the grooves **127** allows guiding regions **128** to be realized in the positioning housing **126**, such as illustrated in FIG. **6***c*. Such as illustrated in FIG. **6***c*, the guiding regions **128** are circularly arcuate. They are located on the inside circumference of the collar **1260**. In the non-limiting embodiment illustrated, there are three guiding regions **128**, two of which end with a stop **128***b*. In one illustrated non-limiting embodiment, each circular arc **128** is thus offset by 120° with respect to an adjacent circular arc.

In one non-limiting embodiment illustrated in FIGS. **1***b* and **4***a*, the open casing **12** further comprises a tab **124** for hooking on the casing **3**. The hooking tab **124** is configured to hook onto the hooking bracket **310** of the casing **3**. As will be seen below, the luminous module **1** is configured to make a rotation and, at the end of the rotation, to hook onto a second casing **3** of the motor vehicle via its hooking tab **124** of its open casing **12**. According to a first non-limiting embodiment illustrated in FIG. **1***b*, the hooking tab **124** interacts with a hooking bracket **310** of the outer-lens holder **31** of the casing **3**. In particular, it is clipped onto said hooking bracket **310**. According to a second non-limiting embodiment illustrated in FIG. **11***b*, the hooking tab **124** interacts with a hooking bracket **310** of the optical-element holder **32** of the casing **3**. In particular, it is clipped onto said hooking bracket **310**.

In one non-limiting embodiment illustrated in FIG. **3***b*, the open casing **12** further comprises means **125** for centering the light source **10** with respect to the optical element **30**.

The secondary electrical-connection element **15** is illustrated in FIGS. **6***a* and **6***b*. As illustrated, the secondary electrical-connection element **15** is connected to the open casing **12**. In one non-limiting embodiment, said open casing **12** is overmolded onto the secondary electrical-connection element **15**. With an overmolding process, the secondary electrical-connection element **15** is placed in an injection mold, then the material of the open casing **12** is injected into the injection mold to obtain the part. This allows seal-tightness to be ensured and a precise assembly dimension to be respected. The secondary electrical-connection element **15** is configured to interact with the primary electrical-connection element **14**. In one non-limiting embodiment, the secondary electrical-connection element **15** is a male connector. Having a male connector on the open casing **12** is simpler to manufacture than having a male connector on the light-source holder **11**.

Assembly, along an X-axis perpendicular to the light-source holder **11**, of the light-source holder **11** and the open casing **12** is thus facilitated by the male connector **15** and female connector **14** such as seen above. Electrical connection of the male connector **15** and the female connector **14** during assembly of the light-source holder **11** and the open casing **12** is thus simple to achieve.

Such as illustrated in FIGS. **6***a* and **6***b*, the secondary electrical-connection element **15** comprises:

- a primary connection portion **150** connected to said primary electrical-connection element **14**, and
- a secondary connection portion **151** connected to the external connector of the motor vehicle.

The fact that the secondary connecting element **15** allows both a connection to the PCBA via the primary connection portion **150**, and a connection to the external connector via the secondary connection portion **151**, makes it possible not to use an internal cable harness between the light-source holder **11** and the external connector of the motor vehicle, which would cause problems with electromagnetic compatibility. Electromagnetic compatibility problems are thus avoided. This also avoids problems with positioning the internal cable harness inside the open casing **12**, once the open casing **12**, the light-source holder **11** and the closing element **13** have been assembled. Specifically, if such an internal cable harness were used, it would be necessary for it to be very long for the light source **10** to be replaceable.

The primary connection portion **150** forms the male connector. It comprises two terminals **150***a*, **150***b* (one positive, the other negative) configured to interact with the two terminals **14***a*, **14***b* of the primary electrical-connection element **14**, respectively. In one non-limiting embodiment, the two terminals **150***a*, **150***b* are integrated into the open casing **12** by overmolding. Such as illustrated in FIG. **6***b*, the primary connection portion **150** extends in a first direction AX. It makes planar contact with the open casing **12**, this preventing any deformation and the terminals **150***a*, **150***b* from moving.

The secondary connection portion **151** forms a male connector that is configured to plug into a female connector (not illustrated) formed in the external connector of the motor vehicle. It comprises two terminals **151***a*, **151***b* (one positive, the other negative). The secondary connection portion **151** extends in a second direction AY. The second

direction AY makes an angle β to the first direction AX comprised between 45° and 135°. By virtue of this arrangement with an angle β, it is possible to mount the luminous module **1** between the second casing **3** and the body of the motor vehicle along the X-axis, and to demount it with a view to replacing it once the luminous device **4** has been mounted on the motor vehicle. This also allows small dimensions, in particular as regards the width of the luminous module **1**, to be achieved, this allowing it to be easily integrated into the space between the second casing **3** and the body of the motor vehicle.

In one illustrated non-limiting embodiment, the angle β is 90°.

Thus, the first direction AX is perpendicular to the light-source holder **11** and the second direction AY is parallel to the light-source holder **11** and to the second casing **3**. Having the secondary connection portion parallel to the second casing **3** allows a connection to be made to the external connector **5** parallel to the second casing **3**. The dimensions of the luminous module **1** may thus be reduced, in particular along the X-axis, and the luminous module **1** takes up less space than if the connection was perpendicular to the second casing **3** for example.

Such as illustrated in FIGS. **4***b* and **6***b*, the primary connection portion **150** and the secondary connection portion **151** are interconnected via an elbow **152** that allows the angle β to be made. Thus, the terminal **150***a* of the primary connection portion **150** is connected by an elbow to the terminal **151***a* of the secondary connection portion **151**, and the terminal **150***b* of the primary connection portion **150** is connected by an elbow to the terminal **151***b* of the secondary connection portion **151**.

An operator mounts the luminous module **1** on the casing **3** of the motor vehicle as follows, with reference to FIGS. **12***a* to **12***d*. In FIGS. **12***a* to **12***d*, the second embodiment with the hooking bracket **310** that hooks onto the optical-element holder **32** of the second casing **3** is taken by way of non-limiting example to illustrate said mounting operation.

In a first step illustrated in FIG. **12***a*, the luminous module **1** is placed by the operator between the second casing **3** and the body of the motor vehicle. He turns it so that it makes an angle to the longitudinal axis of the second casing **3**. The rotation is illustrated by the arrow referenced **60** in the figure.

In a second step illustrated in FIG. **12***b*, the luminous module **1** is positioned by the operator so that the grooves **127** of the open casing **12** of the luminous module **1** are located facing the positioning lugs **300** of the casing **3**. Next, the operator pushes the luminous module **1** translationally along an axis (not shown) perpendicular to the longitudinal axis of the second casing **3** so that the positioning lugs **300** of the casing **3** insert into said grooves **127** of the open casing **12**. The luminous module **1** is thus placed in a first position **p1**. The luminous module **1** is thus pre-positioned on the second casing **3**. The translation is illustrated by the arrow referenced **61** in the figure.

In a third step illustrated in FIG. **12***c*, the operator turns the luminous module **1** so that it makes a rotation. During this rotation, the positioning lugs **300** of the second casing **3** slide along the guiding regions **128** of the open casing **12** until they are stopped by the stops **128***b* of said guiding regions **128**. The rotation is illustrated by the arrow referenced **62** in the figure. The stops **128***b* allow the end of the rotation to be blocked.

In a fourth step illustrated in FIG. **12***d*, the rotation of the luminous module **1** ends when the hooking tab **124** of the open casing **12** meshes with the hooking bracket **310** of the second casing **3**, clipping onto said hooking bracket **310**. Thus, the open casing **12** is locked on the second casing **3**. Thus, the hooking device formed by the hooking tab **124** and the hooking bracket **310** allows untimely unlocking of the open casing **12** to be avoided, especially when the motor vehicle is being driven. The luminous module **1** is thus attached to the second casing **3**. The luminous module **1** is thus placed in a second position **p2**, which could be called the mounted position.

FIG. **12***e* thus illustrates the luminous module **1** passing from the first position **p1** to the second position **p2**.

Of course, the description of the invention is not limited to the embodiments described above and to the field described above.

Thus, in another non-limiting embodiment, said primary electrical-connection element **14** is a male connector and said secondary electrical-connection element **15** is a female connector.

Thus, in another non-limiting embodiment, said secondary electrical-connection element **15** is adhesively bonded to said open casing **12** instead of being overmolded, especially as regards its primary connection portion **150**.

Thus, in another non-limiting embodiment, instead of welding the closing element **13** and the open casing **12** short fastening screws, for example screws that are shorter than 5 mm in length, may be used to fasten them together. In this other non-limiting embodiment, it is furthermore possible to place a seal between the open casing **12** and the closing element of the casing **13**, which makes it possible to ensure not only that the open casing **12** is closed with the closing element **13** of the casing, but also a good seal-tightness.

Thus, the described invention especially has the following advantages:

- it allows the luminous module **1** to be mounted in a limited space,
- it allows said light source **10** to be mounted/demounted along the X-axis on/from the light-source holder **11** without having to demount the entire luminous device **4** and this to be done solely by means of a screwdriver. The casing **3** thus remains mounted on the motor vehicle,
- it allows the use of a cable harness and the problems associated with its use to be avoided.

The invention claimed is:

1. A luminous motor-vehicle module comprising:

at least one light source,

an open casing having the at least one light source positioned therein, and

a closing element for closing said open casing to contain the at least one light source therein, wherein said open casing comprises a positioning housing for positioning the open casing on an end of an elongated optical element to receive light from the at least one light source, said positioning housing comprising a plurality of grooves, and a hooking tab for hooking the luminous motor-vehicle module on a lamp casing of said motor vehicle, said lamp casing comprising an optical element holder configured to hold a portion of said elongated optical element and an outer lens for closing said lamp casing to contain the portion of the elongated optical element therein, said luminous motor-vehicle module being configured to make a rotation engagement with the lamp casing by rotation of the luminous motor vehicle module about an axis of the end of the elongated optical element such that, at an end of rotation travel, the hooking tab hooks onto said lamp casing.

2. The luminous motor-vehicle module as claimed in claim 1, wherein said elongated optical element is a light guide.

3. The luminous motor-vehicle module as claimed in claim 1, wherein said positioning housing comprises two or three grooves corresponding to the respective lugs on the lamp casing.

4. The luminous motor-vehicle module as claimed in claim 1, wherein said hooking tab is configured to hook onto a hooking bracket of the optical-element holder of said lamp casing of the motor vehicle, or configured to hook onto a hooking bracket of an outer-lens holder of said lamp casing of the motor vehicle.

5. A motor-vehicle lamp casing comprising:

an elongated optical element having a light input end,

an optical-element holder configured to hold a portion of the elongated optical element,

an outer lens formed from an outer-lens holder and from a transparent optical part,

a hooking bracket configured to engage a hooking tab of a luminous module which contains the end of the elongated optical element therein, said hooking bracket being secured to said optical-element holder or to said outer-lens holder, and

a rotation engagement configured to make a rotation engagement with the luminous module by rotation of the luminous module about an axis of the end of the elongated optical element such that, at an end of the rotation travel, the lamp casing is rotationally engaged with the luminous module and the hooking bracket is engaged with a hooking tab of the luminous module.

6. The motor-vehicle lamp casing as claimed in claim 5, wherein said elongated optical element comprises lugs for positioning a-luminous module on the elongated optical element.

7. The motor-vehicle lamp casing as claimed in claim 6, wherein said elongated optical element comprises a light input end positioned at the center of said positioning lugs.

8. A luminous device comprising a luminous module as claimed in claim 1, further comprising a lamp casing comprising:

an elongated optical element,

an optical-element holder configured to hold a portion of the elongated optical element,

an outer lens formed from an outer-lens holder and from a transparent optical part,

a hooking bracket configured to engage a hooking tab of a luminous module which contains an end of the elongated optical element therein, said hooking bracket being secured to said optical-element holder or to said outer-lens holder.

9. The luminous device as claimed in claim 8, wherein said luminous device is a signaling light and/or a headlamp, or an interior lighting device.

10. The luminous module as claimed in claim 2, wherein said positioning housing comprises two or three grooves.

11. The luminous module as claimed in claim 2, wherein said hooking tab is configured to hook onto a hooking bracket of an optical-element holder of said lamp casing of the motor vehicle, or configured to hook onto a hooking bracket of an outer-lens holder of said lamp casing of the motor vehicle.

12. The luminous module as claimed in claim 3, wherein said hooking tab is configured to hook onto a hooking bracket of an optical-element holder of said lamp casing of the motor vehicle, or configured to hook onto a hooking bracket of an outer-lens holder of said lamp casing of the motor vehicle.

13. A luminous device comprising a luminous module as claimed in claim 2, further comprising a lamp casing comprising:

an elongated optical element,

an optical-element holder configured to hold a portion of the elongated optical element,

an outer lens formed from an outer-lens holder and from a transparent optical part,

a hooking bracket configured to engage a hooking tab of a luminous module which contains an end of the elongated optical element therein, said hooking bracket being secured to said optical-element holder or to said outer-lens holder.

14. A luminous device comprising a luminous module as claimed in claim 3, further comprising a casing comprising:

an elongated optical element,

an optical-element holder configured to hold a portion of the elongated optical element,

an outer lens formed from an outer-lens holder and from a transparent optical part,

a hooking bracket configured to engage a hooking tab of a luminous module which contains an end of the elongated optical element therein, said hooking bracket being secured to said optical-element holder or to said outer-lens holder.

15. A luminous device comprising a luminous module as claimed in claim 4, further comprising a casing comprising:

an elongated optical element,

an optical-element holder configured to hold a portion of the elongated optical element,

an outer lens formed from an outer-lens holder and from a transparent optical part,

a hooking bracket configured to engage a hooking tab of a luminous module which contains an end of the elongated optical element therein, said hooking bracket being secured to said optical-element holder or to said outer-lens holder.

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